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CONTENTS.

EDITORIALS:
The Convention of the National Electric Light Association.....1185
Operating Lamps at the Best Voltage.....1186
The Next Step.....1187
New York Electrical Society.....1188
International Wireless System Adopted in the United States.1188
Pennsylvania Association Convention.....1188
Bylesby Lunch Club.....1188
Great Demand for Wireless.....1188
Killing Fish by Electricity.....1188
Investigations in Electrolysis.....1188
Automobile Carnival.....1188
Record for Telegraphing.....1188
Illuminating Engineering Convention.....1188
National Electric Light Association.....1189
Commercial Sessions.....1192
Technical Sessions.....1199
Power Transmission Sessions.....1203
Accounting Sessions.....1207
Convention Notes.....1210
Electric Traction with Rectified Current.....1212
New Mexico's Coal Production.....1212
A Defense of the Present Patent Situation.....1212
Electrical Construction in Theaters.....1213
Blank Forms for Use in Electrical Contracting.....1215
Elementary Notes on Alternating Currents.....1216
Grades of Mica.....1217
Chattering and Sparking of Brushes.....1217
Notes on Care of Commutators.....1217
Among the Contractors.....1218
Lighting Circuits Containing Condenser.....1218
Thawing a Water Pipe.....1218
DOLLAR WIRING KINKS.....1219
PUBLIC SERVICE COMMISSIONS.....1220
Program of Meeting of American Institute.....1221
Bi-Monthly Meeting of Central Electric Railway Association.1221
NEW ELECTRICAL AND MECHANICAL APPLIANCES.....1222
CURRENT ELECTRICAL NEWS.....1225
RECORD OF ELECTRICAL PATENTS.....1231

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THE CONVENTION OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

The thirty-fifth convention of the National Electric Light Association, which was held at Seattle, Wash., last week, was noteworthy for the amount of work done and the conspicuous interest manifested by the big men of the electric lighting industry in the proceedings. With characteristic courage President Gilchrist led an army of the most enlightened spirits in the electric lighting field far from the conventional convention meeting place across the continent to the great Northwest. That his judgment was excellent has been more than demonstrated. The commingling of the men from the East with those of the Far West will certainly result in a great forward movement for the electric lighting industry. It will prove an impetus to confidence upon the part of men of big investment of the entire country; it will stimulate everyone who had the good fortune to attend to realize more than ever before the great opportunities for further electrical development, and it will bring about when full publicity of the accomplishments is secured, a better appreciation upon the part of the public of the highly beneficial work for the community the electric light and power corporations of this country are doing.

The rapid growth of the work and influence of the Commercial Section may be particularly noted at this time. The sessions of the Power Transmission Section brought out some of the most interesting information with regard to the latent possibility of the utilization of electrical energy in irrigation and in the rural districts. In the West this has been carried to some extremes not dreamed of heretofore by men on the eastern slope and in the central sections of the country, and it was startlingly refreshing to witness by word of mouth the experiences of those who have reclaimed the arid land and made the desert to bloom. The notable addresses by Mr. Henry L. Doherty and by former Secretary of the Interior Richard A. Ballinger, have served to focus attention upon the extraordinary development of water power which may be accomplished through sane co-operation of the Federal Government and the capitalists of the industry.

The report of the Public Policy Committee and the consequent remarks of Mr. Insull with regard to the welfare work which the central stations of this country are now engaged in are worthy of the widest public recognition. The fact that the members of the Public Policy Committee represent one-half of the money invested in the electric light and power busi-

ness in the United States, or approximately $1,000,000,000 renders their findings of the most serious import. The central stations represented by this committee do not look upon this welfare work from any kind of a charitable viewpoint. It is regarded as a matter of good business to so raise the standard of employment and encourage thrift and comfort among the employees in the central-station industry that the companies represented by this great working element will stand forth as models of their kind in the communities which they serve. No one listening to the earnest address of Mr. Insull can doubt for a moment the sincere attitude of these men toward those upon whom they are dependent for the successful accomplishment of the great plans they have in mind. It should inspire everyone connected with the business to throw every element of enthusiasm, intelligence and loyalty of which they are capable into helping along the development of this great industry.

It is to be hoped that the happy spirit of fraternalism and co-operation which was so manifest at the Seattle convention will sweep the country wide, and that those central-station companies and those individuals in the industry eligible but not now affiliated with the Association, may speedily see the wisdom of joining hands with those who are now promoting the welfare of the electric lighting industry through the operations of the National Electric Light Association.

OPERATING LAMPS AT THE BEST VOLTAGE.

A great many central stations, in supplying tungsten lamps to their customers, have ordered lamps rated at a higher voltage than the nominal pressure of the circuit, and also higher than the rating of the carbon lamps ordered for the same circuits. The probable motive for this action is a desire to avoid trouble from burnouts by burning the lamps at a voltage lower than their rating, rather than higher. Where this is due to a lack of confidence in the constancy of the line voltage, it may be entirely justified, since a slight burning at a voltage higher than normal will greatly shorten the life of a lamp, and it is not desirable where the voltage fluctuates through a large range to burn a lamp at the average voltage, but preferably at a voltage sufficiently below the average to give a normal life.

In cases where a lamp is chosen of high voltage rating and used at a lower voltage to prolong its life beyond the normal value by burning at low efficiency, the practice is entirely unjustifiable, because it is prejudicial to the interests of both the customer and the central station itself.

When a lamp is burned at a voltage below the normal its consumption of power is less than that at which it is rated, and consequently the output and the revenue of the central station is unnecessarily reduced. At this reduced wattage the candlepower is reduced in a still greater ratio, so that the user not only receives less light from the lamp, but he pays for this light at a higher unit of cost owing to greatly reduced efficiency at low wattage. To the central station there is no compensation for the loss, since tungsten lamps are nowhere used upon a free renewal basis. To the user there is a partial compensation of longer life and hence less frequent renewals, but this is not sufficient to counterbalance the disadvantage, since the lamp is rated at that voltage which represents the greatest economic usefulness when both first cost and energy consumption are considered. With the recent practice of applying a triple rating to the lamp, some discretion can be used by choosing that rating which is best suited to the local conditions, most important of which is the charge for energy. There is probably no place in this country, however, where the charge for residence lighting is low enough to make any other than the top voltage rating applicable. It must be an exceptional case, therefore, in which any other than the top voltage rating should be followed.

It consequently seems incumbent upon central stations to supply lamps whose top voltage rating will correspond to the actual voltage of the circuit upon which it is to be used, except in those cases where the fluctuations in voltage are unusually large. Indeed in many cases it will actually be to the advantage of both the customer and the central station to apply to the lamp a voltage even higher than its rating, as was well brought out in a paper presented at the Seattle convention of the National Electric Light Association by Messrs. R. E. Campbell and M. D. Cooper. In the case of metalized filaments the desirability of this high voltage is even greater.

It is a short-sighted policy of the central-station manager which fails to recognize these points and to endeavor to supply to the consumer the lamp which is best fitted to the voltage condition of his line.

THE NEXT STEP.

The central station for the supply of electric current originated with the perfection of the electric lamp as a commercial means of illumination. Some of the early stations were at first utilized merely for street lighting, but interior illumination soon found wide application, and the demand for electric current for this purpose has seen a steady increase for over 30 years. The supremacy of the electric method of illumination was early established, but the campaign to extend its usefulness for this purpose still continues. Since artificial illumination is required in few places during daylight hours, the early central-station load was essentially a night load, and except for street lighting the demand for current extended over but a few hours.

With the electric lighting industry fairly upon its feet, utilization of electric power in other directions was greatly developed. The services of the central station were called upon for other purposes and at other times. The wide applicability of the electric motor to power applications gives it a wide field of

usefulness, which sponsors of electric development were not slow to follow up. A similar campaign for an electric-power load was consequently launched, and it, too, is still continuing, with a steady annual increase in connected horsepower.

Minor applications of electric current have occurred in other fields, such as electrochemical and electric-heating work. These have formed a very small percentage of the output of the central stations. The electric railways have as a general rule produced their own power in isolated plants, and it is only lately that it is coming to be realized that they can be supplied with advantage to both producer and consumer from the central station.

There is one application of electricity, however, which can be made so general that it should in the future form a large element of the output of every central station in the land, and the next step in central-station development should be the acquisition of this potential load. Electric cooking represents a great possibility for the central station and one which has been entirely too much neglected up to the present time. It is an application that concerns every central station and every customer who is now within reach of the facilities of central-station service. Suitable equipment for this purpose has finally been developed to the point where general satisfaction can be expected from its use. The principal obstacle to its introduction seems to be generally regarded as one of cost, but it is a debatable question whether this is the real obstacle in the way of progress. Electric lighting was firmly established while its cost was still greater than that of other illuminants, and is now being largely used in places where that relation still holds true. It has spread, not on account of its cheapness, but in spite of its cost, and owing entirely to its other advantages. Electric power is sometimes installed with the object of lowering the immediate expense for power. In many other cases the reason has been, rather, its great utility and convenience, coupled with considerations which affect matters of cost rather indirectly. Similarly, electric cooking should find its general introduction and firm establishment on other grounds than its cost, and when its advantages are fully appreciated, it will be introduced whether it is cheaper than other methods of preparing food or not. It is not necessary to enumerate its many advantages here, as these have been frequently referred to in these columns. Suffice it to say, that while central stations should make this development as attractive as possible from the standpoint of expense, they should, nevertheless, inaugurate a vigorous campaign to demonstrate to the public those advantages which will outweigh in its eyes even a disadvantage which will exist in many places from the standpoint of cost.

The first step in converting the public to this idea is a demonstration of the advantages. This has been done to a small extent at electrical shows and other exhibits by distributing samples of electrically cooked food. Only a very small fraction of the public can be reached in this way and something more continuous and far reaching is very necessary.

Every city of considerable size should have in a prominent location a restaurant which should serve nothing but electrically cooked food. Under proper management this should not only serve the purpose of publicity by attracting general attention to its existence, but should also prove a commercial success. The excellence of its output as well as its novelty should make it at once popular. The element of expense would have little weight in determining its prosperity, since the cost of fuel or of current is not one of the major items in any high-class restaurant. Even if the question of cost were important, it has been demonstrated that where electric energy can be supplied for two cents per kilowatt-hour the cost of electric cooking is no greater than with fuel. In London a restaurant supplying electrically cooked food is in successful operation. Why cannot the same thing be done in any large American city?

There is really no question of the success of such a venture, but even if such a restaurant were operated at a loss for a short time, its advertising value would more than repay the central station for the expenditure. Since it is the central station which is to benefit by the increased load which will inevitably follow the popularization of electric cooking, it is the central station which should inaugurate this enterprise. It has become quite common for central-station companies to carry on electric shops for the display and sale of electric appliances, and to invade the field of the contractor in house-wiring where i was felt that this was necessary to properly push a campaign for increased service. The same considerations make it incumbent upon the central-station interests in every large city to see that a restaurant is established devoted to electric cooking.

In several instances electrically prepared meals have been supplied to a large number of persons upon the occasion of some banquet or other special meeting. This will be repeated next week at the rejuvenation of the Sons of Jove, which is to be held at the Hotel Sherman, Chicago. Every electrical advocate should have sufficient enterprise to see that this procedure is repeated wherever electrical men gather to break bread; and it should become the rule rather than the exception that an electrical banquet should be electrically supplied. But such meetings, even though they become general, would acquaint only those with the excellence of electrically cooked food who are already somewhat familiar with the facts and would not extend this knowledge to the general public in the way that must be done. Only by means of public restaurants where the every-day citizen on the street will have impressed upon him the possibilities in this line, and have, moreover, the opportunity to appreciate the available benefits to himself, can the general sentiment of the community be brought to an appreciation of electric cooking to the extent that has already been done for electric lighting and motor applications.

New York Electrical Society.

At the meeting of the New York Electrical Society on June 13 the following officers were elected for the coming year: Henry L. Doherty, president; A. L. Doremus, Frank W. White and Edward C. Titus, vice-presidents; George H. Guy, secretary, and Herbert S. Spencer, treasurer.

A lecture was given by Earle L. Ovington on "Aeroplane Wireless and the Problem of the Modern Flying Machine."

According to the secretary's report, 94 members were elected during the season and 155 were dropped for non-payment of dues, leaving a membership of 733. The energetic and persistent work of the treasurer has given notable results. Last November the amount owed by members for dues was $2,672, now it is $145.

The secretary announced that as a result of a meeting of the Membership Committee called some months ago by H. L. Doherty, chairman, a prominent member of the society has presented a cup to be given to the member securing the largest number of candidates for membership during the coming season. For next year the society has arranged one of the finest programs the society has ever had.

The meeting was preceded by a dinner at the Cafe Boulevard. After dinner Augustus Post gave a most interesting account of some of his exciting balloon experiences, illustrated with lantern slides.

International Wireless System Adopted in the United States.

The United States has arranged to carry out the Berlin wireless-telegraph agreement by systematizing the call letters of American ships. Hitherto this system has not been used in this country. The Bureau of Navigation has been conferring with American ship owners, nearly all of whom have agreed to adopt the list which the Bureau has arranged for wireless calls. Each call consists of three letters and the continental Morse code is to be used.

The International Bureau at Berne, Switzerland, has the duty of seeing that the same call letters are not assigned to more than one wireless station, and the Bureau of Navigation has made arrangements with the Berne Bureau for the proper assignment of call letters to all American ships and shore stations. The International Bureau has assigned the series beginning with *K* and *W* to American merchant vessels and yachts, and the series beginning with *N* to the vessels of the United States Navy. As far as practicable the same second letter of the call will be assigned to vessels of the same line, while the third letter will be distinctive.

Pennsylvania Association Convention.

The fifth annual convention of the Pennsylvania Electric Association will be held at the Bedford Springs Hotel, Bedford Springs, Pa., on September 4, 5 and 6. A good program of papers is being arranged and the Entertainment Committee promises something good for both the ladies and gentlemen attending the convention. Special rates are being made by the hotel, which has accommodations for 800, and a very successful convention is anticipated.

The president of the Association is R. S. Orr, of Pittsburgh, and the secretary is Walter E. Long, 1000 Chestnut Street, Philadelphia.

Byllesby Lunch Club.

At a meeting of the department heads and other employees of H. M. Byllesby & Company on June 5, in Chicago, Ill., it was decided to form a Byllesby Lunch Club to meet once a week at luncheon. The object of the club is to discuss matters pertaining to the work of the company and to better acquaint the employees with one another. A committee composed of F. H. Lane, J. W. Link and M. A. Morrison was appointed to prepare the weekly programs, serving for a period of three months. H. V. Coffy was elected secretary.

The first regular meeting was held on June 12 in the German Grille Room of the La Salle Hotel. R. J. Graf, secretary of the company, gave a very interesting talk concerning the relations of the finance department to the other departments of the company.

Great Demand for Wireless.

Applications from shipping companies for additional wireless operators for service on board transatlantic liners are being received so rapidly by the Marconi Wireless Telegraph Company that the present school at Liverpool, England, is unable to supply the demand and a new school is being opened in London.

It is estimated that already 100 ships have been supplied with relief operators since the *Titanic* disaster. There are at present over 1,300 merchant ships now equipped with wireless apparatus.

Killing Fish by Electricity.

The high tension trolley line of the Indianapolis, New Castle & Eastern Traction Company has been utilized for killing fish in Sugar Creek, Ind. A wire was connected to the high-tension line and to the water of the creek, and the fish were so stunned that they could be caught in nets as they floated on the water. The five men who tried the experiment were each fined $39.

Investigations in Electrolysis.

During the past year an extensive investigation into the subject of electrolysis has been in progress by the Bureau of Standards, Washington, D. C. Damage to water and gas pipes and other underground structures by stray electric currents has long been a source of serious trouble. Much work has been done by private interest with a view to mitigating the evil already. Also during the last few years a great deal of attention has been drawn to the possibility of damage to reinforced concrete structures, due to stray currents, and much alarm has been created in some quarters lest great damage to buildings, bridges, etc., may result from this cause. Although the possibility of damage of this sort had been established little was known before this investigation was started in regard to the extent of the damage that had occurred, the conditions under which trouble might be expected, or the best method of mitigating the evil. Information on the subject can be obtained from the bureau.

Automobile Carnival.

An automobile carnival week is to be held in New York City from July 14 to 20, inclusive, by the Hotel and Business Men's League, in connection with the summer festivities. On Tuesday, July 16, the Electric Car Division will hold an automobile flower pageant in the evening with illumination by electric light. On Saturday, July 20, in the evening, there will be an automobile carnival party devoted to industrial motor cars, especially illuminated and grotesquely decorated. On Thursday there will be an automobile tour.

Record for Telegraphing.

The flood of telegrams received at and sent from New York on April 18, the day of the arrival of the *Carpathia* with the survivors of the *Titanic*, represented a total of 715,000 words, a new record for telegraphic communication for the Western Union Telegraph Company.

The highest record for one day's transmission previously made was during the Republican convention in 1908, when the total reached 433,000. Of the 715,000 words transmitted on April 18, 45,000 were sent to Europe.

Illuminating Engineering Convention.

The sixth annual convention of the Illuminating Engineering Society will be held at the Hotel Clifton, Niagara Falls, Ontario, September 16 to 19. A number of notable papers are being prepared and an unusually good program is promised for this occasion:

National Electric Light Association.

Report of the Thirty-fifth Annual Convention at Seattle—Papers and Discussions at the General, Commercial, Technical, Power Transmission and Accounting Sessions—Convention Notes and Exhibits.

The thirty-fifth convention of the National Electric Light Association, which was held at Seattle, Wash., from June 10 to 14, will go down in history as one of the most interesting and successful conventions ever held by the Association. The total registration of representatives of central-stations, manufacturers of electrical apparatus, representatives of the technical press, and the guests of all of these, approximated 1,500. While this was not as large an attendance as has marked many other previous conventions, what was lacking in numerical strength was easily made up in enthusiasm and in the sincere and consistent interest manifested in all of the proceedings.

The convention arrangements this year were especially good. The various sessions were held in the Seattle Armory, and ample space was also available on the main floor for the great exhibition by the Class D members. The acoustic arrangements were well nigh perfect, it being easy to hear the speakers in any part of the assembly rooms, and there was an entire absence of any conflicting noises, which have marred conventions held at other places. The members of the committee under the direction of Mr. Gilchrist are to be congratulated for the excellent carrying out of the plans for the comfort of those attending the convention.

The local electrical interests were lavish in their generosity looking toward the comfort and entertainment of the visitors. The streets leading to the Armory and the principal hotels were festooned in incandescent lamps and many flashing devices added a great attractiveness to the scene. The local cars of the Puget Sound Traction, Light & Power Company were at the disposal of the visitors on several special occasions. In the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of June 15 a comprehensive report of the first General Session and the first Commercial Session was given. In the following pages will be found a complete report of the proceedings of the General, Executive, Accounting, Power Transmission, Public Policy and Commercial Sessions.

Second General and Executive Session.

The second general and executive session was called to order by President Gilchrist at 10 o'clock Wednesday morning.

Frank M. Tait,
President-Elect, National Electric Light Association.

The report of the Rate Research Committee was read by E. W. Lloyd, Chicago, chairman. The report recommends that the work of compiling all available electric rate information be pushed to an early completion and published. That the plan of appointing member company assistants to the Rate Research Committee be continued, and that the weekly rate research bulletin (which has been sent to those companies assisting in the work of the committee) be sent to them, the expense to be arranged for by the executive committee. That, in general, the committee recommends either a demand or a straight-line meter charge for small business, and a charge based upon demand, for large business. That all member companies adopt the form of schedules recommended by the committee, and arrange to file and publish same with the National Electric Light Association as soon as possible, and not later than September 1, 1912. These schedules are made a part of the report, as an appendix. The committee, in attempting to make its report of interest and most general use, has of necessity adopted several viewpoints, and endeavored to recommend as few rates as possible to cover the fundamentally different local conditions which it recognizes as existing. The following suggestions are made:

Large consumers — lighting and power: A block rate, making separate demand and energy charges.

Small consumers—commercial lighting and power: A block rate, making separate demand and energy charges; based on electrical demand, with a minimum demand. Or, a straight line or block rate carrying kilowatt-hour charges only; with suitable minimum.

Small consumers — residential: Either a two-charge rate, based on demand, with a minimum demand estimated on a floor area or room basis. Or, a straight line or block rate carrying kilowatt-hour charges only; with a suitable minimum.

Very small residences: A demand rate, based on controlled or limited demand.

Opening the discussion, H. L. Wallau, Cleveland, analyzed the advantages and disadvantages of the systems suggested by the committee, and favored the use of the "Active-Room Socket Demand" system as offering the most rational method of establishing an equitable system of charging.

Arthur Williams, New York, stated that the New York Edison Company employs to a great extent the maximum-demand system, but it finds the maximum-demand principally desirable in some parts of its business. The company adopts the maximum-demand principle wherever that principle seems to be the best for its interests, and it

relies on the so called straight-line meter rate when that seems to be the more desirable method of charging for current.

Eliminating certain special instances, it was Mr. Williams' belief that the unanimous opinion of the men in his company who come in contact with the public would be that the simplicity, the directness, the ease with which the straight line system is understood, possesses a great many intrinsic advantages. Mr. Williams further said that he could not find any justification for the basing of any price upon the floor area or the number of rooms in a house, and that he hoped to see that recommendation taken out of the report.

In answer to a question, Mr. Wallau stated that in Cleveland a careful check upon their system had indicated that the demand amounts to about 25 to 30 per cent of the connected load. It is assumed arbitrarily that 70 per cent of the lamps installed in active sockets are 50-watt lamps and 30 per cent are 25-watt lamps; or this is the equivalent of saying that 85 per cent of the sockets contain 50-watt lamps. Four-tenths of this number of standard lamps is taken as the demand, all other lamps and appliances in other parts of the house being included.

John W. Lieb, Jr., emphasized the importance of filing rate schedules as a practice wholly to be commended, believing that nothing else would so materially establish confidence between the company and its customers.

Mr. Insull said that there is no way of getting a proper return upon the money invested in a plant except by selling the product on a system of rates that takes into consideration the points controlling that investment. No system of average rates so far devised takes into consideration the question of investment. The only possible way to take this investment into consideration; the only way to control the investment that will have to be made to take care of a given amount of business is by a system of rates that has for its basis the demand for energy.

P. Junkersfeld suggested the desirability of placing the limit between the primary and secondary rate for long-hour users at a point which gives residence consumers an opportunity to enjoy a certain portion of the low rate.

R. H. Ballard, Los Angeles, Cal., described the methods in vogue in his city, and as effected by the ruling of the city council. This is in effect on the block system, ranging from a maximum rate of six and one-half cents per kilowatt-hour for the first 100, and scaling down to 2.4 cents for large blocks. This makes it necessary for the consumer enjoying the lowest rate to pay his proportion of the high rate also. Mr. Ballard also called attention to the opportunity for making special rates for off-peak business, and thought this should be taken into consideration by the committee.

At the close of the discussion it was voted to continue the committee, and request it to make a further report in 1913.

The paper by C. A. Monroe, entitled "The Desirability as a Central-Station Load of Pumping for Municipally-Owned Water Works," was read by title and ordered placed in the record.

The meeting was resolved into an exectuive session. The report of the Public Policy Committee was adopted and the committee that prepared the report on constitutional amendments elected to consider this report and report later. The report of the treasurer was read and adopted.

Third General and Executive Session.

The third general and technical session was called to order by President Gilchrist at 2:30 o'clock, Thursday afternoon. The first paper was entitled "Some Uses of Metals," by W. R. Whitney, in the absence of whom the paper was read by C. W. Stone. In this paper Dr. Whitney makes a short inventory of the metals most commonly available and of use in the electrical industry. He refers to the advance made in the casting of copper, which, through the use of bronze is now available of high conductivity, high density and freedom from blow holes. The advent of the electric furnace has made the preparation of alloys of iron more attractive than ever before, because now the melting of even very refractory mixtures, such as those high in molybdenum, chromium, titanium, tantalum or tungsten, is relatively easy. The metal titanium is worthy of especial consideration. Silicon-iron alloy is now used in all high-grade transformers, and the elimination of this element in the construction of the apparatus would result in a great increase in the cost of operation. Tungsten is rapidly finding new fields of use; it has such a high melting point that it will replace platinum for many uses.

In the discussion of this paper C. E. Bogardus, Seattle, pointed out the desirability of making prospectors familiar with these metals, so that in their quest for gold, silver and copper, they might recognize and uncover stores of minerals that could be of great usefulness in the manufacture of electrical apparatus.

The report of the Committee on Street Lighting was presented by John W. Lieb, Jr., New York, chairman. This report reviews the history of the effort to bring about uniformity in the character of the considerations involved in city street lighting, and calls attention to the displacement of the direct-current series open arc, and the present tendency toward the displacement of the alternating-current series inclosed arcs with luminous flame arcs and the remarkable impetus given to street lighting by the important improvement in tungsten incandescent lamps. This also increases the difficulty of making comparisons of the illuminating effects produced by the several types. The large facilities required to make the research necessary to provide necessary data upon which to base standards to meet present requirements have discouraged the committee from undertaking a special research along these lines at this time. The report outlines the factors which should be covered in an investigation, and in its conclusion refers to a number of opinions which the courts and state utility commissions have expressed in a number of cases which have come before them. These opinions form an appendix to the report.

The report of the Committee on Constitutional Amendments, Frank W. Frueauff, chairman, was read by H. H. Scott.

Upon motion of W. C. L. Eglin, seconded by H. L. Doherty, the greetings of the convention were sent to Miss Harriet Billings in recognition of her efficient and loyal work.

Mr. Eglin presented the report of the committee on the president's address, commending to the careful reading of the members this address, and endorsing the recommendation made by the president regarding the increasing of the membership and the appointment of a traveling representative for the association. The committee endorses the recommendation that the Question Box be edited by a permanent editor, located at executive headquarters. It also recommends that the number of vice-presidents be increased. It agrees with the president that the dues of the member companies should be increased, and recommends also that the matter of establishing the reserve fund recommended by the president be taken up.

Farley Osgood reported the discussion and conclusion of the Technical Section with respect to the report of the Committee on Overhead Line Construction, and presented the resolution from the Technical Session calling for the adoption of the report by the general session, with such changes as had been suggested by the Technical Section. This motion was carried.

W. H. Blood, Jr., reported the action of the Technical Section in approving the report of the Committee on Grounding Secondaries. Mr. Blood moved that the executive session ap-

prove and adopt the report of the Committee on the Grounding of Secondaries, and that it be referred to the executive committee of the Association for its approval before it becomes binding upon the Association. The motion was carried.

Secretary Martin presented the report of the Committee on Memorials, which was adopted. The meeting voted to approve the action of the executive committee in making A. C. Dunham, Hartford, Conn., an honorary member of the Association.

The secretary read the report of the Committee on Resolutions, conveying to the numerous committees, individuals and corporations the thanks of the Association for the many courtesies received. These included the exhibition commitee, M. A. Singer, decorator; the members of the transportation committee and the railroad association handling the special trains; the lighting companies, boards of trade and others who entertained the delegates en route, the entertainment committee; the Puget Sound Traction, Light and Power Committee, the several other committees; the McGraw Publishing Company, for the *Convention Daily*; the technical press and the local press; the municipal authorities; the commercial section; the meter committee; the executive secretary and the staff of the Association, and the Hon. R. A. Ballinger for his address before the power transmission section.

Mr. Freeman announced that C. N. Duffy, Milwaukee, had won the Doherty medal in the Companies Section session for the best company paper; that C. J. Russell, Philadelphia, and Egbert Douglas, Milwaukee, had been accorded honorable mention for papers presented. Mr. Doherty announced that the Doherty medal had been hung up for another year, and suggested two other medals, a silver and bronze medal, or money prizes to be used for the purchase of books, to the value of $50 and $25 respectively. He offered these prizes upon the condition that the second prize, the silver medal, be called the Billings prize, or the Billings medal, in recognition of her faithful work for the Association.

Mr. Doherty presented the report of the Nominating Committee, as follows:

President, F. M. Tait, Dayton, Ohio.

First vice-president, J. B. McCall, Philadelphia.

Second vice-president, H. H. Scott, New York.

Treasurer, W. W. Freeman, Brooklyn, N. Y.

To serve on the Executive Committee for three years: John A. Britton, San Francisco; C. E. Groesbeck, San Diego; Charles A. Stone, Boston.

To serve on the Executive Committee for one year: R. S. Orr. Pittsburgh.

Mr. Doherty explained that this year it had been necessary to name two vice-presidents because of the resignation of Arthur S. Huey, Chicago, who found it imperative to withhold his acceptance of this position because of the encroachment of business matters upon his available time.

Upon motion it was unanimously voted that the secretary cast one ballot for the election of these officers.

Mr. Doherty escorted Mr. Tait to the platform, where he was warmly greeted by President Gilchrist.

Mr. Tait thanked the Association for the honor it had bestowed upon him and promised to fulfill the duties of his office to the best of his ability.

Upon the close of the session both Mr. Gilchrist and Mr. Tait were the recipients of the unstinted felicitations of everyone present, Mr. Tait, a hearty wish for a happy and successful administration, and Mr. Gilchrist, sincere congratulations and appreciation of a magnificent record in office.

Public Policy Session.

The Public Policy Session was called to order at 8:30 o'clock, Wednesday evening, June 12. A delightful feature of these exercises was the singing of the Commonwealth Edison Section Quartette, Messrs. M. R. McGovern, W. R. White, M. L. Eastman, Harold Wright, assisted by C. A. Lind, piano.

President Gilchrist introduced F. W. Hild, Portland, who extended a hearty invitation to the Association and its members to visit Portland at the close of the convention.

The report of the Public Policy Committee, Arthur Williams, chairman, was read by Samuel Insull, president of the Commonwealth Edison Company, Chicago. This report reaffirms the suggestions made in the report of last year, and urges upon member companies that the utmost care be used to eliminate on their part any condition leading to friction, criticism, or a sense of injustice. In all relations with the public or private, nothing should be approved which contains the slightest degree of injustice or unfair dealing.

The report urges the acceptance of the principle in the membership, and by those engaged in the manufacture of apparatus and equipment, that the establishment of competition operates against, not for, the public good; it tends to destroy existing values and to create new obligations of uncertain stability. With extending and wise legislative control of utilities, the committee believes that the continued acceptance of the principle of a regulated natural monopoly is beneficial, and not harmful, to the public and the public service interests. The report presents a very interesting resume of the welfare work which is being carried out to a remarkable extent by central stations in every section of the country. The report reviews the development of labor exchange, the minimum wage, the undesirability of underpaid labor, the necessity and economy of attention to hygiene and safety, and recommends careful study of these subjects. An analysis of the cost of welfare work, and the decision of the Kansas Public Utilities Commission in refusing an application for a competitive franchise in Parsons, Kan., are given as appendices.

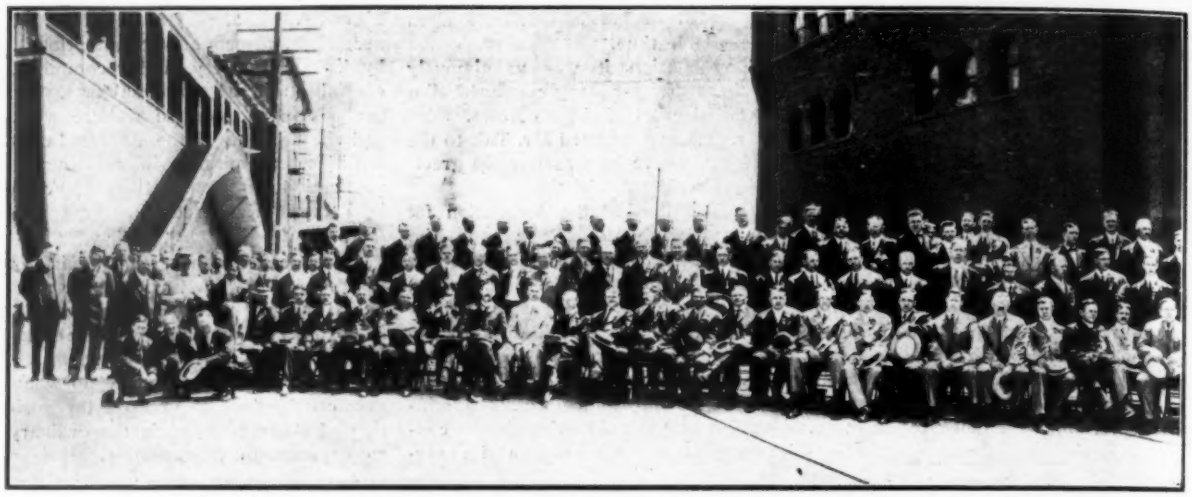
At the conclusion of the reading of the report Mr. Insull said that it must not be inferred that the companies look in any way at the welfare of their employees from a charitable viewpoint. It is a part of good business to do whatever can be done to improve the position of those engaged in the ordinary employment of the business. It is a proper part of the cost of production. In raising the standard of employees generally the companies are placing themselves in a better position to serve the communities in which they may be located. With regard to municipal ownership, Mr. Insull reiterated what he has said upon so many other occasions, that the generation and distribution of electrical energy in any community can be most economically operated by concentration of the generation and distribution of that energy for every purpose. The establishment of a commission to regulate the activities of public service corporations will go far, Mr. Insull believes, to remove from the public mind the idea that there is anything particularly wrong with the business. Mr. Insull reviews the financial aspects of the public service business and called attention to the large investment that is inevitably involved in handling the business. Mr. Insull suggested that the Public Policy Committee co-operate with the power transmission section in the securing from the Federal Government proper opportunities for opening up hydroelectric sites, and to secure the necessary legislation that will give a fair protection to the capital invested.

Upon motion by Mr. Leib the report of the public policy committee was formally adopted.

The report of the Medical Commission on the Resuscitation from Electrical Shock was presented by W. C. L. Eglin, Philadelphia, who after ontlining the results accomplished by the commission, gave a physical demonstration, with the assistance of Mr. Ewing, of the prone method of inducing artificial respiration described in

the chart and booklet issued by the commission.

The session was concluded by a very interesting address by David B. Rushmore, Schenectady, N. Y., on the Electrification of the Panama Canal. This address was illustrated with lantern slides, and was highly enjoyed by a large attendance which remained until the conclusion despite the very late hour.



Left-Hand Group at National Electric Light Association Convention, Seattle, June 10-14, 1912.

Special Irrigation Session.

As a result of the interest expressed in the subject of irrigation and its relation to the distribution of electricity and the electric drive, a special session was held on Thursday morning. This was attended by about fifty delegates, and A. L. McArthur, of the Pacific Power & Light Company, Portland, presided. The development of electric irrigation by the Mount Whitney Power Company was described by John C. Hays, Visalia, California. The average size of the motor for irrigation is seven and one-half horsepower, running up to a maximum of 75 horsepower. There is a tendency for the electric power companies to charge very low rates for irrigating power, but the most popular contract is based upon a flat rate of $50 per horsepower year. About five acres of orange-growing lands are irrigated per horsepower on the Mount Whitney system. The irrigation load is practically continuous throughout the season, and 90 per cent of the entire output of the Mount Whitney Company is used in pumping water.

The commercial methods of electric irrigating service were described by A. E. Wishon, Bakersfield, California. It is estimated that the cost of line construction is about $650 per mile and the pumping plants have an efficiency of about 50 per cent.

Company Sections Session.

The Company Sections Session was held on Thursday afternoon. W. W. Freeman, chairman, announced that the Doherty Medal had been awarded to C. N. Duffy, Milwaukee. Mr. Freeman also explained that all papers given during the twelve months ending January 1, 1913, will be eligible for the 1913 medal to be awarded at the next convention.

The paper entitled "Educating Central-station Employees," by H. E. Grant, was presented. Mr. Grant pointed out the desirability of adopting a systematic method of educating central-station employees for their specific duties. If to knowledge is coupled personal application, enthusiasm and loyalty the best results can be secured. Patience and persistence are essentially necessary in educational work. Mr. Grant described in detail the educational course inaugurated by the New York Edison Company. This is set forth as an appendix to the paper.

Secretary Martin outlined his plan for a Company Section Lecture Bureau. The purpose of the lecture bureau is to supply lectures and lecturers either for local programs or to supplement local efforts. If the bureau plan is carried out each Class D member company of the association would be invited to prepare a lecture on some new apparatus, invention or problem with which it is concerned. The bureau would preferably be under the control of the secretary, and in order to ensure novelty the material of the lectures would be preserved exclusively for the section meetings, permission to be withheld from the press except in the case of brief abstracts. By subjecting the lectures to the censorship of a committee their contents could be kept up to a high standard of quality.

Commercial Sessions.

The first session of the Commercial Section was opened shortly before three o'clock Tuesday afternoon by Vice-president Tait, who presented H. J. Gille, chairman of the Section. Mr. Gille's address and a résumé of the business transacted at this session appeared in our last issue. Following Mr. Gille's address, W. W. Freeman, of Brooklyn, addressed the meeting on "The Commercial Development of the Electrical Industry." This was followed by the report of the Membership Committee and the reports of the Committees on Steam Heating and Refrigeration, Ventilation and Laundry Machinery. The following is an abstract of the latter report.

Refrigeration, Ventilation and Laundry Machinery.

This report is necessarily divided into three sections, each treating one of the three subjects. The first section, devoted to refrigeration, contains an interesting discussion on this subject by R. L. Lloyd, of Philadelphia. There are two systems in use for artificial refrigeration, termed the direct-expansion system and the brine-circulation system. In the former the refrigerant piping is exposed within the space to be cooled. In the brine-circulating system the brine is forced through the pipes and returned to the point where the refrigerant extracts the heat from the brine. In the latter case it is necessary to use a pump to circulate the brine. Suggestions are made as to the proper system to recommend and formulæ given for determining the size

of equipment for given installations. Curves showing the desirability of this business from the central-station standpoint are also reproduced. This section of the report concludes with complete power data on a number of typical installations and interesting statistics and data on ice-making for central stations.

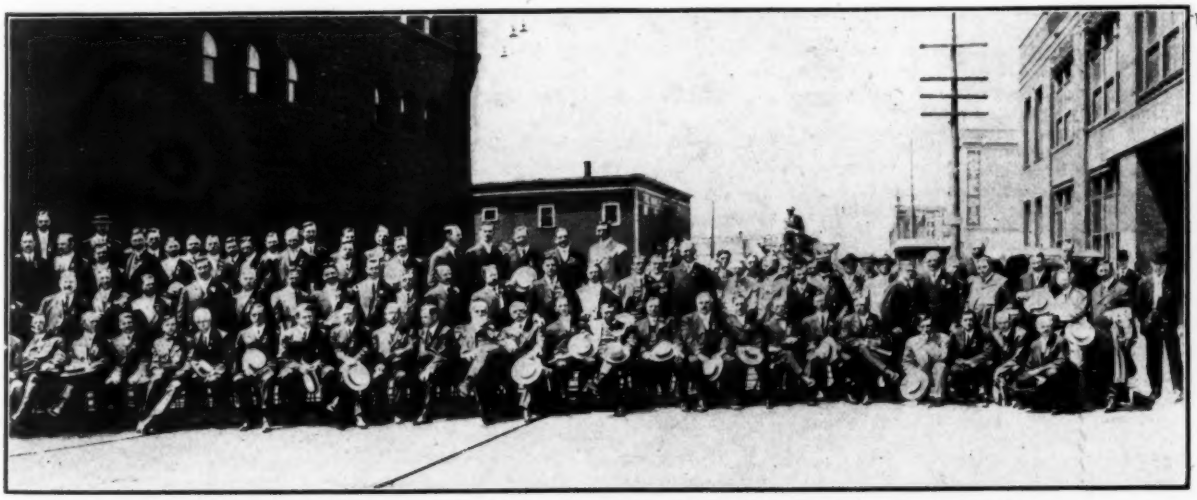
The section devoted to ventilation treats principally hotel and restaurant ventilation. The requirements which must be met are: Fresh air must be supplied to all parts of the building occupied by guests or employees, and this air must be entirely changed or renewed every few minutes; the air must be washed free of dust and other impurities; the air must be cooled in summer and heated in winter; the foul air must be exhausted, particularly in the kitchens, grill rooms and bathrooms; the rate of supply and exhaust must be adjusted to conditions to be met in the different rooms and corridors, and the pressure directed to avoid unnecessary drafts, particularly those occurring at an entrance or doorway on an exposed corner. The fans most popular for hotel service are of the multivane or paddle-wheel type. The propeller fan is used for exhaust purposes, particularly in small capacities and against very low pressures. Supply and exhaust fans for indirect-heating systems are operated at low speeds. The characteristics of the motors and control apparatus necessary for this service were discussed.

The first portion of the section devoted to the question of laundries contains a brief paper by John Richmond, of Rochester, N. Y., in which the author holds that central stations cannot supply the entire power requirements of a laundry and effect a saving or even compare with isolated-plant costs. He suggests, however, that considerable profitable business can be obtained by supplying energy for overtime and breakdown service, signs and general lighting. This paper is followed with power data on a number of laundries purchasing power for all requirements from central stations.

I. Lungaard, of Rochester, opened the discussion, calling attention to the provision which must be made for cooling the circulating air which must be admitted to butchers' boxes. The air, he said, has to be cooled, and in many instances the amount of refrigeration necessary to condense and freeze the moisture in the air is greater than the amount of refrigeration necessary to take care of radiation losses through the walls.

E. W. Lloyd, of Chicago, recounted the experiences of the Commonwealth Edison Company in selling power to ice manufacturers. Seven plants, having an aggregate output of 600 tons of ice per day, are purchasing power from the Edison company. The annual load-factor on this business is between 55 and 60 per cent and the consumption of energy averages 50 kilowatt-hours per ton of ice. The business, with few exceptions, is entirely off-peak. The company has an off-peak rate that entitles a customer having a connected load of 200 kilowatts to a rate of approximately one cent per kilowatt-hour. On this basis Mr. Lloyd said no trouble is encountered in securing this class of business. Two of the plants are using raw water and the others distilled

Middle Group at National Electric Light Association Convention, Seattle, June 10-14, 1912.



Right Hand Group at National Electric Light Association Convention, Seattle, June 10-14, 1912.

water, a new distilling device being used in all plants. Mr. Lloyd said that complete operating data on these plants will be available in the fall.

R. H. Tillman, of Baltimore, presented some data on conditions in his city. About 500 horsepower in motors have been installed in various plants, mostly refrigeration plants, within the past four months. On account of good load-factor the company finds the business extremely desirable.

Following this discussion Chairman Gille appointed a Nominating Committee consisting of J. F. Becker, J. G. Learned, M. C. Osborne, C. N. Stannard and L. R. Wallis.

Second Session.

The second session of the Commercial Section was held on Tuesday evening, Chairman Gille presiding. The first report was that of the Committee on Competitive Illuminants, Ward Harrison, of Cleveland, reading the report in the absence of F. H. Golding, chairman.

Competitive Illuminants.

The report of the Committee on Competitive Illuminants is devoted entirely to the discussion of electric versus gas lighting. The opinion is expressed that the most successful method for the electrical solicitor to pursue where non-electrical illuminants are sought to be replaced is not different from that which should be employed when no competition is met with. However, where competition must be met, the salesman must exercise more than usual care to insure that the system which he recommends is not wasteful. Many merchants change from gas to electric lighting for the same reason that they install new store fixtures or make other improvements. Therefore, they may be content to pay even several times as much for attractive electric lighting as for the old unsatisfactory gas equipment. Where a prospect raises the question of expense of electric lighting, it is necessary to show him exactly what the cost will be. This should be given in as compact and specific form as possible. If gas is employed the cost of such lighting can be readily ascertained from the monthly gas bills and a knowledge of what maintenance charges or rentals are being paid for gas arcs or similar equipment. In order to compare what electric service would cost an estimate can be made of the number of hours per year that the lamps will be used. This again may be obtained from the customer's gas bills and a knowledge of the hourly consumption of his lamps. In such a calculation proper allowance must be made for the gas consumed in pilot lamps. The committee recommends the basing of comparative costs on actual installations rather than on candlepower-distribution curves and other illumination data. A decided disagreement of the rating of gas lamps by different laboratories is pointed out as showing the need of placing little stress on such rated performances. The very great depreciation of candlepower of mantle burners is carefully pointed out, this rising to 50 per cent and over in some cases. Gas salesmen lay great stress on the effect of voltage fluctuation on the candlepower of tungsten lamps. The report discusses this at length, and shows that in the case of lighting circuits having a regulation poorer than five per cent the total operating costs are not very seriously affected. In fact, for operating at voltages higher than the normal the cost will actually decrease. On circuits having voltage regulation better than five per cent it is unnecessary to make any allowance at all for their voltage fluctuation or for other than the rated life of the lamps. Great stress has been laid on the effect of dust on lamps and reflectors, but with ordinary care, involving the cleaning of the lamps about once a month, the depreciation from this source is not very great. Certainly it is very much less than the corresponding depreciation in gas equipment if it receives no more care. A number of instances of actual cost comparisons are recorded in this report, in which it is shown that in comparison with even the most efficient type of inverted Welsbach lamps the use of tungsten lamps will frequently show decided economy after all proper charges have been allowed. In the conclusion of the report brief reference is made to residence lighting, in which it has been found by one central-station company that the exploitation of a 60-watt tungsten lamp, equipped with a proper reflector, brought about the replacement of a great many mantle gas lamps. In general the solicitor does not need to place much emphasis on cost in order to obtain new business in electric lighting, but even when there is close competition with other illuminants, careful analysis will show in most cases that a comprehensive cost comparison will prove advantageous to electric lighting.

R. B. Mateer, of Denver, opened the discussion. He said that the solution of the question of gas or electricity for illumination lies in educating the public to appreciate the advantages of the latter. He also called attention to the necessity of making every installation a modern and efficient one.

Mr. Rummel, of Vancouver, asked for information relative to the ignition device for gas lamps which does away with the necessity for a pilot flame. Mr. Bibbins, of San Francisco, replied that such a device, employing batteries, was being installed by gas companies with apparent success.

Mr. Thompson, of San Francisco, inquired as to how electric light companies were meeting the competition of gas arcs.

T. K. Jackson, of Mobile, replying to the question of Mr. Rummel, said that any ignition device that operated by a battery is subject to trouble. Regarding the competition of gas arcs he said he greatly lessens the competition by properly maintaining the customers' equipment. Tungsten clusters, particularly, should be washed periodically.

Ludwig Kemper, of Albert Lea, Minn., thought that the figures on cost of tungsten lighting were too low; also that the consumption of the gas pilot light given in the committee's report was too high.

J. G. Learned, of Chicago, thought that the ordinary central-station solicitor could not handle the large installations. These should be left to the illuminating engineer. Speaking of gas-arc competition he said that the advertising value of an electric installation is most important. Competition of gasoline and acetylene is more to be feared than gas, but this is being successfully met by central stations.

Norman Macbeth, of New York, thought that lighting competition should be met in exactly the same manner as competition in power. He criticised several statements in the committee's report relative to the gas situation, particularly that statement wherein it was claimed that 90 per cent of the gas used for illumination is from open flames. He said that the question of gas competition was purely a question of salesmanship.

Mr. McMicken, of Portland, Ore., stated that gas competition, at least in Portland, is a serious proposition. Gas, there, is sold for $1.00. The new inverted gas arc consumes about 13 cubic feet of gas per hour. Assuming a use of 2.5 hours per day for 30 days, gas would cost about $1.00. To compete with this installation approximately 400 watts in one or more units have to be installed. The consumption would be about 30 kilowatt-hours, which at eight cents per kilowatt-hour would make the cost of electricity $2.40. Mr. McMicken stated that many smaller stores and business institutions considered this difference in cost to be of greater importance than any advantages of electricity.

E. L. Callahan, of Chicago, thought that salesmen should lose sight of the fact that gas is cheaper and should confine their efforts in encouraging the smaller establishments to follow the footsteps of their more progressive competitors. He said that the companies under Byllesby management were having excellent success in replacing gas arcs with 250 and 500-watt tungstens. In some cases these were cleaned without expense to the customer, and Mr. Callahan thought that central stations could also afford to renew lamps if gas competition demanded it.

T. I. Jones, of Brooklyn, stated that in Brooklyn the company has established the practice of installing 500-watt tungsten lamps where the customer desires one lighting unit. These lamps are supplied free of charge and this cost is even less than the maintenance cost of the old arc which most companies maintained without charge to the customer. On this basis considerable business is obtained which would ordinarily go to the gas company.

L. G. Gresham, of Bluefield, W. Va., said that competition is being met in Bluefield by the installation of tungsten clusters on a rental basis.

Harold Almert, of Chicago, stated that

both the gas and electric propositions have merit. The question of competition there resolves itself into (1) education; (2) service, and (3) cost.

George R. Stetson, of New Bedford, Mass., thought that the most important feature of electric lighting was its cleanliness as compared with gas.

The discussion was closed by Ward Harrison. He said that the electric ignition devices mentioned in the early part of the discussion were comparatively new and high in first cost. He thought that an improvement would be made in the efficiency of the electric lamp before the devices were in general use. He also spoke at some length on the question of cost and salesmanship.

Chairman Gille announced that the Committee on Industrial and Commercial Lighting had no report to present, its efforts for the year being devoted to the publication of the two valuable and comprehensive booklets on these subjects which were distributed at the meeting.

Before adjournment, T. I. Jones, of Brooklyn, called attention to the advisability of using the term salesman instead of solicitor in referring to central-station business getters.

Third Commercial Session.

The third Commercial session was called to order by Vice-Chairman H. J. Gille, Minneapolis, at 2:30 o'clock, Wednesday afternoon.

W. H. Hodge, Chicago, presented the report of the Committee on Electric Advertising and Decorative Street Lighting.

Electric Advertising and Decorative Street Lighting.

The report of the Committee on Electric Advertising and Decorative Street Lighting is in two sections, the first dealing with street lighting, and the second with electric signs. The report opens with a brief reference to the illustrated handbook on the subject of ornamental street lighting that was prepared under the direction of the committee and of which 10,000 copies have been printed. Out of 1,874 cities of 5,000 population and over, in the United States and Canada, about 275 now have ornamental street-lighting systems. While this shows the progress that this movement has made it also shows the desirability of greatly extending it. An important development along these lines is the proper and artistic illumination of public buildings, squares, bridges, plazas, etc. Practically all of the ornamental street lighting has taken the form of curb posts bearing tungsten clusters, and, while these have almost invariably given excellent results, a few cases of failure or dissatisfaction have been noted, but on investigation these have been found to be due to poor design both on the engineering and commercial sides. The Committee recommends that the central-station companies install and retain ownership of the ornamental systems so as to insure proper maintenance. The Committee does not agree with the statement occasionally made that ornamental street lighting militates against electric signs, window lighting and building outline lighting. In fact, each of these has a distrinct field of its own and they all may be co-ordinated very satisfactorily. Street-lighting systems have a potent influence in bringing about improvements of the streets and abutting buildings. The advertising value of ornamental street lighting is unquestioned. It also has a decided ethical value because a thoroughly lighted street cannot be made the theater of wrongdoing. A notable development in ornamental street lighting has been the use of the magnetite flame arc in a special ornamental housing which has been very satisfactorily installed at New Haven, Conn.

In the second section of the report, that dealing with electric advertising, the Committee strongly urges the central stations to insist on good mechanical and attractive sign effects because unsightly or poor signs create unfavorable comment and criticism, and may lead to unreasonable municipal restrictions. Considerable care should be taken in the selection and recommendation of sign displays. All installations should be made with a view to anticipating future municipal requirements. Central stations, sign manufacturers and affiliated interests should encourage the compilation of data on electric signs. Within a few years it is very likely that present designs and crude installations will be replaced by more distinctive and artistic creations. Therefore, data on present displays will be invaluable. Motion signs are very much more effective than the steady-burning type. Electric signs should be beautiful by day as well as by night. Novelty should be developed, as it makes a sign very much more effective. Where city ordinances are pending regarding electric signs, central stations should urge enactment of very liberal ordinances and also a special provision for elaborate and extensive electrical effects for temporary service in connection with special public celebrations. In the first appendix to the report are given detailed data on ornamental street lighting installations in 50 cities of the United States and Canada. The second appendix describes the new type of magnetite arc lamp that has been particularly adapted for ornamental street lighting and of which the best installation so far is at New Haven, Conn. The third appendix gives a number of letters from commercial associations and chambers of commerce, all of which attest the great desirability and undoubted commercial and general municipal value of ornamental street-lighting systems.

Mr. Gille was of the opinion that more attention should have been given to the use of arc lamps for street and decorative lighting. Striking examples of ornamental street lighting with arc lamps occur in Philadelphia, Boston, St. Louis, New York, and all with different forms of units. Reference is made to the lighting of open squares, plazas and approaches; and undoubtedly this form of public light will be best served by high intensity units, arc units, either the flaming arc or the luminous arc, with two or four or more lights or lamps to the post. This character of equipment is usually massive in design, and is possible of architectural treatment conforming to the individuality of a civic center at least, equally as well as with single or cluster Mazda units.

J. G. Learned did not agree with the idea that it is wise to have the municipality bear the expense. He preferred rather to get the merchants to bear the expense in the installation, but not the municipality; and in order to further the idea, he thought it good policy for the central station to make a special flat rate for the service which it furnishes to the merchants for the operation of the system; and in addition to that, furnish the lamp renewals, under a long-term arrangement or contract, preferably five years, and if possible ten years.

F. S. Baker, Butte, said that at the last session of the legislature in the state of Montana, a law was passed creating an improvement lighting district; the lighting posts had to be put in at certain distances apart, and the expense of lighting was paid by the municipalities and taxed against the property owner. In streets in which there are street railways, they are taxed with one-sixth of the cost. The company keeps up the payments.

R. B. Mateer, Denver, said that in Denver there are three of the principal business streets lighted with arcs installed on ornamental poles which are the result of a competitive submission of various designs which were acted upon by a civic commission. On some of the streets, working in conjunction with the tramway company and the citizens, it was possible to install poles with arc lamps, and on the opposite side of the pole there was hung a dead arc. Recently a demand for greater street lighting has resulted in the merchants paying a sum sufficient to burn both of these arc lights. It has not detracted from the amount of money that the merchants will spend for display lighting in the shop window, or sign on the roof; but by the use of arcs he believes that it can be so arranged that additional arcs can be installed and a considerable revenue added to the central station.

L. H. Newbert, San Francisco, called attention to the highway lighting act, in California, which permits thickly settled portions of the country or a territory which is unincorporated, should it desire street-lighting service, by a vote of the residents and property owners, to create a lighting district. If the vote is favorable, the supervisors call for bids for the installation of the system. The system is the property of the lighting company. A special tax is levied by the assessor for

meeting the expense of maintaining the system. The longest term contract which the districts have entered into is a period of five years.

The report of the Committee on Electric Vehicles was read by L. R. Wallis, Boston, chairman.

Committee on Electric Vehicles.

The major portion of this committee's report is a commentary on the replies received from central-station companies in the larger cities in response to the Committee's request for data. A list of 20 questions was submitted to 150 companies and replies received from 67. Replies do not indicate that the number of electrics predominate in level country. Of the 67 companies reporting, 40 have in use 73 passenger and 371 commercial electrics, while 18 of the central stations use no electrics at all; and yet, in the territory served by these 18 companies, there are 648 electrics in use by the public. This would indicate that in some, if not in most territories, the public appreciates the advantages of electric transportation to a greater degree than the central stations which are supplying current for their operation. There are a total of 27 passenger and 100 commercial gasoline machines and 993 horses being used by the reporting companies, a large percentage of which will naturally be replaced by electrics in the near future. Within the territory represented by this report there are 11,044 passenger and 2,619 commercial electrics in service aside from those in use by the central stations. Two of the companies have electric-vehicle clubs or similar organizations for, the purpose of stimulating the sale and use of electric vehicles, while the remainder have exerted no organized efforts to bring about these results, although 10 companies co-operate to some extent with electric vehicle agents in offering machines for demonstrations, free current for signs and certain classes of advertising, and 12 have automobile departments for the purpose of stimulating electric-vehicle business and the sale of electric vehicles. The other 55 evidently have not given this much attention. Seven of the companies are agents for electric vehicles. In no case does the central station issue regular instructions for the care and operation of vehicles and batteries. Twenty-five companies provide charging facilities. Twenty-three companies make a special rate for off-peak charging. In answer to the request for suggestions as to best methods for popularizing electric vehicles in the various territories, many bits of advice were received. Eight companies suggested a reduction in the cost of the vehicles themselves, eight advised advertising, two suggested a lower rate for current, one advocated off-peak rate, four suggested the establishment of an Electric Vehicle Department; four, the use of electrics by the central stations themselves, with an offer to loan them for demonstrations; five favored co-operation with manufacturers; ten, the education of the public, and three, getting manufacturers to establish agencies. Other suggestions were educational campaigns, improved rates, and personal solicitation of prospects; commissions to agents on cars sold and the installation of public charging stations in convenient places. In view of the excellent showing made in certain sections where the electric has been given a fair and impartial opportunity to demonstrate its superior advantages, and considering the increasing demand for modern methods of transportation and the satisfactory manner in which the electric has met and fulfilled these demands when selected for the work to be done and intelligently cared for; in view also of the attractive off-peak load which the charging of these vehicles presents, the Committee recommends that central stations take an active interest in the introduction of electric vehicles in their respective territories, and, while making use of them in their own business with a view to determining the economy resulting from their use and their dependability, an educational campaign should be started for the purpose of impressing upon the public the possibilities of the electric, concerning which it is, with few exceptions, in profound ignorance.

R. B. Mateer said that in Denver alone, which is a city of 213,000, there are now operating over eight hundred pleasure vehicles, and over thirty electric trucks, varying from seven hundred and fifty pounds up to five-ton trucks. This is probably largely due to the maintenance of the electric vehicle department, which is under the direction of Dr. Egstrome, who seems to be quite an expert in his line. He supplies the complete operating instructions to all operators of pleasure vehicles, and will cheerfully supply specifications for such electric trucks as they care to install, preparing tables of comparative cost between electric transportation, gasoline, and horse-drawn vehicles. A great number of inquiries are secured through newspaper advertising, not sparing any particular expense, but on an average of at least once a month taking a whole page in each of the leading daily journals, and the leading newspapers of the state, principally in the Sunday issues, and putting in the names of those who have been converted to the use of the electric vehicle, as well as placing therein a statement of some of the operating costs which may perhaps reach the eye of some prospective customer. In addition to that, an electric-vehicle magazine which is published once a month is maintained, the total expense being paid by the Denver Gas & Electric Light Company; and this is distributed not alone to all present users, but to all who are treated as good prospects for an electric vehicle, either for pleasure or commercial purposes. This is emphasized with such pamphlets of instruction and operation as may be necessary, an instruction sheet, and also with personal letters and personal solicitations. At the present time the load purely from electric vehicles is in excess of two million kilowatt-hours per annum.

W. H. Blood, Jr., discussed the work of the Electrical Vehicle Association of America, of which he is president, and outlined the field in which the electric truck was highly successful and the methods which should be used to overcome ignorance and prejudice with regard to the reliability of the electric vehicle.

In reply to a question by S. V. Walton, Mr. Mateer said that in Denver for pleasure vehicles they are charging in the private garages a rate of four cents per kilowatt-hour, with a discount of ten per cent, and a guarantee of a minimum of $5 per month. The public garages have an optional rate—four cents a kilowatt-hour, with a discount of 10 per cent, with a further 25-per-cent discount, or a three-cent net rate where the sum is over $50 gross; or what is sometimes referred to as an outright rate, which is generally termed the open fixed charged meter rate, which is $24 per year per horsepower connected, plus three cents, with a discount varying as high as 50 per cent, that discount depending largely upon the demand and the transformer capacity to take care of the installation.

John G. Learned, Chicago, chairman, presented the report of the Committee on Electricity in Rural Districts.

Electricity in Rural Districts.

This report opens with a brief account of the growth of the electrical industry up to the present time and a discussion of the factors that have made this growth possible. A considerable portion of the report is devoted to test data on various machines and apparatus used on the farm, such as churns, washing machines, hay hoists, corn grinders, cream separators, etc., complete information being given as to the first cost, operating cost, efficiency, and consumption per unit of output. The question of irrigation is taken up and numerous curves presented showing the possibilities of this field. Numerous abstracts of articles and papers on the subject under consideration are presented and the report concludes with a list of the articles which have appeared on the subject during the past year.

S. V. Walton, San Francisco, said that with the Pacific Gas & Electric Company the question of construction of the lines is one that has not been completely solved, although they have changed the policy at various times, always becoming more liberal. When distribution was started branches from the main transmission lines of 60,000 volts had to be made. They were not particularly anxious to get this class of business, feeling that it would not pay; and in those cases, the farmers were asked to stand the entire cost of the line; and in some cases the line belonged to the power company and in others the line belonged to the consumer. Those arrangements were unsatisfactory, and later it was followed up by cash payment, being an advanced payment and payment out in current. The company now builds lines for the consumer at its own expense, hangs transformers, and gives the consumer the voltage he desires

either 110, 220 or 440, doing this upon a basis of 10 per cent; in other words, where the greatest annual business is 10 per cent of the original investment; where the line is built into territory on its own premises, the company will stand the entire cost. This varies up as high as 50 per cent in some cases, when the company is not so well satisfied with the territory in which the line is extended. Ten dollars per horsepower per year is considered a satisfactory rate for this class of business. The lines cost all the way from $400 per mile to about $800 per mile.

H. S. Wells, Portland, Ore., said the Pacific Power & Light Company was ready to extend its lines for irrigation business on a basis of 35 per cent to 40 per cent; that is, that the earnings of the first year will aggregate 35 or 40 per cent of the total cost of the line, and the total cost of the line includes the cost of motors and putting up, and everything; they figure the revenue on an average of from $25 to $35 on meter rates, and $42 on flat rates. That is for a six-months' irrigation season. The farmers frequently find they cannot use enough power to justify the line; and in such case a proposition of paying a proportion of the cost of the line as much as the land will justify is made, and they give a check for the amount necessary to make up a thirty-five per cent basis; then at such time as the business on the line reaches a 35 per cent basis, the company refunds. This has worked out very well, and this year since January the company has taken on about 130 irrigation customers, about 900 horsepower.

The paper, "Plan for Increasing Power Load," was read by H. W. Cope, Pittsburgh. This was published in full in our last issue.

The report of the Committee on Selling Current to Large Power Users of the Rocky Mountains and Pacific Coast States was read by Joseph B. Lakes, chairman.

Selling Power to Large Power Users in West.

This committee corresponded with central-station companies in the far Western and Pacific Coast states with the view of ascertaining the actual conditions in these states regarding large power business. The report is based on the replies received. Twenty-four companies replied, reporting a total of 461 large customers. Of these 212 represented installations of less than 200 horsepower; 141 of 200 horsepower and over and less than 500 horsepower; 53 of 500 horsepower and over, and 55 of over 1,000 horsepower. The complete schedules of rates of some of the companies were given. Opinions as to the most practicable method of charge to large power users are summarized as follows: Nine of the companies favored a block system schedule with suitable minimum charge based on connected load; four favored a service charge based on the connected load plus a kilowatt-hour rate for current consumed; the remaining six favored a straight meter rate with a suitable minimum charge in proportion to connected load. For determining the maximum demand 11 of the companies replied, advising that they consider the curve-drawing wattmeter the most practical; four favored the Wright demand meter; three, the maximum-demand indicator; one, the curve drawing ampere meter; one the average during one hour test; and one, testing with indicating instruments. Nineteen companies reported the connected loads of large power users now using power other than that supplied by a central station as varying from 0 to 40,000 horsepower with a total of about 125,000 horsepower. A list of reasons why central-station power is not used in numerous industries is presented in the report.

Fourth Session.

The fourth session of the Commercial Section was called to order by Vice-President Tait on Thursday morning and the meeting turned over to Chairman Gille. The first report was that of the Committee on Residence Business, this being presented by J. F. Becker, chairman.

Residence Business.

The report of the Committee on Residence Business is one of the most comprehensive and important reports presented before the Commercial Section. It is divided into three parts, the first comprising a digest of answers received to 51 questions asked by the Committee, covering the methods and systems employed in obtaining residence business. The second part contains reports on the activities of the commercial departments of several large electric light companies covering the methods of securing residence business, policy as regards wiring, rates, etc. The final portion of the report comprises illustrated descriptions of new and improved domestic electrical appliances placed on the market during the year. The entire report covers 92 pages and is replete with interesting data. Replies to one question indicate that in cities of 100,000 population and over 88 per cent of the wired houses are using electricity and 23 per cent of the total number of dwellings are using electricity. In cities between 100,000 and 25,000, 90 per cent of the houses wired are using electricity and 23 per cent of the total number of houses are using electricity. In cities between 10,000 and 25,000 population, 95.5 per cent of the houses wired are using electricity and 33 per cent of the total houses are using electricity, while in cities of less than 10,000 population 96.5 per cent of the wired houses are central-station customers and 41 per cent of all houses are using electricity. These statistics are based on replies received from 235 member companies.

C. N. Stannard, of Denver, commented on the fact that eastern companies employ more salesmen than the western companies, due to the fact that a large portion of the houses in the west are of comparatively recent construction and therefore wired. A relatively small number of houses are piped for gas. Considerable soliciting has to be done, however, to increase the use of domestic electrical appliances.

R. B. Mateer, of Denver, discussed in detail several features of the report from the standpoint of the Denver company. In securing the business of large residences, the illuminating engineering department is called upon to design a scientific installation. Regarding the sale of appliances, Mr. Mateer said that considerable success has resulted from placing various devices in homes on trial. Between 4,000 and 5,000 irons are sold on this basis annually.

In reply to a question of E. H. Mulligan, of Pasadena, as to whether or not the local dealers complain of the central station selling devices, Mr. Mateer said that all dealers maintain the same prices as the company and no complaints have been heard.

M. C. Osborne, of Spokane, stated that his company had 14,000 residence customers and only about one per cent of the residences in Spokane are piped for gas. The company has recently inaugurated a house-wiring campaign, allowing the customer to pay for the work in installments. The local contractors do all wiring and the money is advanced by the central station. Mr. Osborne thought that this arrangement was an excellent one as every contractor is a booster for electric service. About 100 houses are being wired each month.

C. P. Dodd, of Denver, mentioned the practice of the Denver company in cooperating with architects, this resulting in an efficient distribution of sockets for lighting, motors and appliances.

Douglass Burnett, of Baltimore, explained in detail the conditions in his town. Since the fire of 1904 the company has increased the number of customers from 4,000 to 25,000. Of this number about 8,000 are residence customers. Mr. Burnett said that as Baltimore was one of the first cities to have a gas company, it has been rather difficult to effect a change to electricity, particularly among the conservative classes. About 50 houses are now being wired each month. Mr. Burnett referred to the conditions that previously obtained with the local electrical contractors. There was no co-operation previously but since the decision of the Maryland Commission allowing the central station to do a wiring business and conduct an electrical salesroom an agreement has been made whereby contractors participate in the wiring business. The contractors have also agreed to refer their customers to the company's store and a commission of 5 per cent is allowed them on all such sales made.

L. H. Newbert, of San Francisco, stated that about 70 per cent of the residences in the territories served by the San Francisco company were wired.

Recently a campaign was started to bring the number up to 90 per cent and today only about 16 per cent are yet to be wired. The company charges a flat rate for a specified number of outlets. Contractors do the wiring and are paid by the company, who collects from the customer in 12 monthly installments. Where new houses are being constructed efforts are made to have the wiring installed so as to accommodate the greatest number of appliances.

P. S. Dodd, of Cleveland, spoke of the opportunity for co-operating with contractors, jobbers, architects and manufacturers for increasing business and moved that the incoming president appoint a committee to meet with similar committees of the associations representing the above to devise suitable means for co-operation. The motion was put and carried.

At this point motion pictures showing ideal equipments in the home were displayed by Mr. Christian, who explained that the company he represented would be glad to loan the films to all central stations interested.

The report of the Committee on Cost of Commercial Department Work was then presented by E. L. Callahan, chairman.

Report on Cost of Commercial-Department Work.

The efforts of this Committee were confined principally to determining what methods of keeping costs of commercial-department work are being pursued at the present time by central-station companies. A circular letter together with a cost-sheet form was sent to central stations in various sections of the country and the number of replies indicated that central stations in towns of 25,000 and less do not segregate the cost of commercial department from general operating expenses. The Committee therefore drafted a form, which is presented in the report, for keeping a consecutive record of monthly reports, applicable to central stations of all sizes and situations. This form is in conformity with the National Electric Light Association uniform system of accounting. The Committee strongly recommends that this, or some similar form be adopted.

A complete tabulation is made of the replies received from those companies keeping separate cost records. This tabulation includes, for each company, the gross revenue, increase in gross revenue for 1911, total cost of commercial department including advertising, per cent of total cost to gross, amount of gross increase per dollar of commercial cost, gross number of contracts obtained, commercial-department cost per contract obtained, kilowatt equivalent of contracts obtained, and commercial-department cost per kilowatt connected. Commenting on the figures tabulated, the report states that in ordinary situations as found in the majority of cities throughout the country, if from two per cent to two and one-half per cent of the gross annual revenue were spent in commercial-department work, for each dollar so spent there might be expected $4.00 in increased gross revenue. The tabulated returns show further that under average conditions the following schedule represents present practice in the number of solicitors retained in the field actively engaged in securing contracts: Companies in towns of 25,000 population and less, one solicitor per 10,000 population; in towns of 25,000 to 100,000 population, one solicitor per 15,000 population; 100,000 to 250,000 population, one solicitor per 15,000, and in cities of 250,000 and over, one solicitor per 20,000 to 25,000 population.

Before entering into a general discussion the report of the Committee on Contract Order Routine was presented by J. E. Davidson, of Portland.

Contract Order Routine.

This report presents comprehensive data on the proper method of procedure in the connection and disconnection of customers. Within the past few years nearly every large central station has had this matter up for consideration and the result of the ideas tried out by the larger organizations is embodied in this report, together with certain modifications. The routine given is presented with special reference to the sales, credit and installation activities, no reference being made to meter, billing and auditing departments. In presenting this report the procedure is first to discuss the principal features under consideration and then outline skeleton forms of connection and disconnection order routine, applicable with slight modifications for use by any of the larger companies. The connection routine has been divided into two subdivisions—where the applicant is along the company's lines, and where an extension of the company's mains is required. Two subdivisions are also made in the disconnection routine—first, where the disconnection originates on the initiative of the customer; second, where the disconnection originates on the initiative of the company.

Douglass Burnett, of Baltimore, opened the discussion, suggesting the adoption of short forms for commercial department work. In Baltimore, by adopting this practice, all orders are completed within 48 hours. This is made possible by taking advantage of all short cuts in routine.

Clare N. Stannard, of Denver, stated that the Denver Gas & Electric Light Company invariably completes all orders in less than 24 hours except where line extensions are necessary when the time is extended to three days. He said this is made possible by the use of a house-card system. Every house in the city is listed on a card and all conditions are given that are necessary to complete an order.

W. H. Hodge, of Chicago, spoke of the necessity of determining the cost and efficiency of central-station advertising and suggested that a new committee be appointed to investigate this subject.

C. M. Thomas, of New York, asked Mr. Stannard if the company was not required to obtain a city permit before making connections and how they are obtained. Mr. Stannard replied that the city inspectors co-operate with the company in giving prompt service and have never delayed the issuance of a permit.

S. H. Wallace, of St. Louis, presented figures showing the cost of commercial department work. In 1909 this cost was 2.03 per cent of the income of the company, which increased the income $7.15 for each dollar spent. In 1910 the cost was 2.07 per cent which produced $5.64 per dollar spent. In 1911 the cost was 1.63 per cent which produced $6.00 per dollar spent.

The discussion of these two reports was closed by T. I. Jones and Arthur Williams. A motion was made by the latter to the effect that the Commercial Section continue the collection of data on these subjects.

The report of the Nominating Committee was then presented by J. F. Becker, as follows:

Chairman, E. W. Lloyd, Chicago.

Vice-chairman, T. I. Jones, Brooklyn.

Executive Committee, E. L. Callahan, J. R. Crouse, J. F. Becker, F. H. Gale, F. B. Rae, Jr., M. C. Rypinski, George Williams, P. S. Dodd, J. C. McQuiston, Stanley Walton, C. N. Littlefield, H. J. Gille, Douglass Burnett, W. E. Robinson, and a member of the National Supply Jobbers' Association and the National Electrical Contractors' Association. The secretary is to be appointed by the Executive Committee.

W. H. Hodge, of Chicago, moved that the secretary be instructed to cast the ballot of the Section for these nominees, which was carried and the officers declared elected.

E. W. Lloyd, the new chairman, made a few brief remarks, thanking the Section for the honor conferred upon him, following which E. L. Callahan presented the report of the Committee on Commercial Section Digest.

This report is prepared in loose-leaf form and in two parts. The first part contains over 100 sheets of data on motor installation, including the results of tests and actual results under operating conditions. The second part contains abstracts of articles which have appeared in the technical press relating to similar subjects.

The concluding feature of the convention was the paper on "Ozonators and Their Exploitation by the Central Station," by M. O. Troy. This paper was presented by the author, following which the meeting adjourned.

Ozonators.

This paper presents to central stations the many possibilities of ozone and ozone-producing apparatus as a means of increasing revenues. The paper opens with a description of ozone, giving an account of its history and properties and some interesting suggestions as to the introduction of ozone-producing devices with a brief description of them. During the last few years the designs of ozone producing devices and our knowledge as to ozone have advanced wonderfully. The production of ozone by electrical methods

has superseded all others and it should naturally prove of unusual interest to the central-station manager. It will find its greatest field in therapeutic, sanitary and industrial applications. There are almost numberless processes of manufacture wherein oxidation plays a prominent part. Wherever oxidation is desired ozone is a logical adjunct to the process and is being so used, although in a number of instances the processes are secret. These processes usually require ozone in very high concentrations, much higher than is desirable or permissible in therapeutic applications, or applications to purposes of sanitation. The production of ozone for such processes can be undertaken with a high degree of efficiency and on a basis of economy which permits and warrants its application in many fields already developed and in speculative fields which are almost limitless. The great fundamental principle of ozone action makes it possible to use it in the preservation of food. Experiments have shown that milk and other dairy products can be completely sterilized and kept from souring for a long time. Eggs stored in ozonized air keep for months with no apparent change, and the effect on fruit is very striking, as ozone prevents the molding which starts on the outside of the skin. Refrigerating engineers have found that ozone adds greatly to the value of plants for storing meat products and that the temperature of the refrigerating room or chamber can be considerably higher in the presence of ozonized air than under ordinary conditions. As a preservative, ozone is destined to meet with considerable use, supplanting in a degree the use of drugs, sugar and sterilization by heat. Considerable success has been secured by the installation of ozonizers to prevent the growth of parasites in the storage of flour and flour products. It has been applied in many breweries in England and Belgium, where its use in cellars prevents parasitic growth and has no unpleasant effect on the fermenting process. In France, manufacturers of wines and liquors have found that the use of ozone destroys the unpleasant odor and tends to oxidize the fusel oil in products which have not been sufficiently aged. In this way manufacturers have been able to produce wines and liquors in three to nine months which can hardly be distinguished from similar products which have aged from two to ten years. These manufacturers have found that the use of ozone is of much value in sterilizing the implements used in the manufacture of wines and liquors. Ozone is also a valuable bleaching agent and it is being used in the manufacture of certain chemical substances, especially mineral, vegetable and animal fats, oils and greases. The bleaching effects of ozone are superior to those of chlorine, and are all the more striking as it not only serves to bleach but to destroy disease-producing organisms. There are hundreds of applications of ozone which are as yet barely appreciated. The bleaching and sterilization of fine fabrics, ostrich feathers and even laundry work, is already appreciated by a few and will be used by the majority in the years to come. In the sterilization of drinking water ozone has made great strides and the author gives figures on the extent to which this practice is being adopted. The paper concludes with descriptions of various types of ozonizers.

Technical Sessions.

The first session of the Technical Section was held Tuesday afternoon with W. C. L. Eglin in the chair. The first report was that of the Meter Committee, which was presented by the chairman, O. J. Bushnell.

Committee on Meters.

The greatest difficulty in meter work is securing properly trained metermen, and it is largely for the instruction of new men in this work that the committee has prepared the Electrical Meterman's Handbook, which is now ready for distribution. This deals with meter questions in an elementary, practical way, so that it is valuable for the instruction of new men, and yet covers all technical questions which may arise in the management of a meter department. Reference is made to the work on the Meter Code, which is being carried on by the committee in conjunction with a committee of the Association of Edison Illuminating Companies and the Electrical Testing Laboratories. The specifications of the Code have been reviewed and slightly modified. Sections 5 and 6 of the Code, dealing with protective devices and installation methods, are given in the report. New types of watt-hour meters and demand indicators are mentioned. Work is progressing on the standardization of meter design and meter terminals. This will result in uniform dial faces on all meters. The use of the ampere-hour meter for small consumers, where the cost of a watt-hour meter is burdensome, is considered.

The discussion was opened by Mr. Rhodes, of New York, who spoke of the necessity of a cheaper meter for small direct-current customers. The ampere-hour meter is largely in use abroad and would often be serviceable in this country. Regarding the three-point method of testing, he stated that it had been satisfactory to the Public Service Commission, to the consumer and to the company. His experience was that it did not take any more time for a three-point test than for a two-point test.

Mr. Northmore, of Los Angeles, favored the use of ampere-hour meters on direct-current circuits but thought it would be retrogression to use them on alternating current.

Mr. Jamieson, of Vancouver, B. C., also favored these instruments for direct current, where they were even better than the watt-hour meters. He referred to the conditions in British Columbia, where the Government tests and seals the meter and it is inaccessible to the company for five years.

Joseph B. Seaman spoke in favor of companies adopting the meter with bottom terminals. He agreed with Mr. Rhodes regarding the three-point method, but as results of the two-point method were almost the same he did not see any necessity of using three points.

Mr. Vaughn, of Schenectady, pointed out that central-station men had no hand in the legislation in Canada, as they had in the United States, and the lawmakers did not have the advantage of their advice. There is a similar condition in England, where the Board of Trade makes rigid specifications which are not enforced.

Mr. Bushnell closed the discussion, calling attention to the fact that representatives of the public service commissions had co-operated with the committee. The committee did not go into the relative advantages of the one-point, two-point and three-point methods of testing, which work remains for the next committee.

The next paper, by S. D. Sprong, entitled "Meter Installations," was, in the absence of the author, presented by Mr. Corbett, of Seattle.

Meter Installations.

Under present conditions it costs the operating company too great a percentage of its gross income to do business with the small consumer. The number of installations of a given size increases as the size of the meter decreases, and, in a typical case considered, small meters aggregate about three-quarters of the total, with an average cost of installation of the meter of $13. Allowing $15 for the meter and 10 per cent for interest and depreciation, with 60 cents as yearly cost of testing, it is shown that $3.40 of the income must be applied to meter maintenance. This is a large per cent of the gross income. Such small consumers are often unprofitable. Unless substantial gain is made along this line it may be necessary to connect all small customers without meter on a service charge. The author considers standard devices to minimize the cost of labor and material on the customer's premises and also devices for preventing the theft of current. Appliances for this purpose are listed, including a simple form of meter-testing block.

The discussion was opened by Mr. Rhodes, of New York, who thought that the meter-testing device mentioned in this paper would be very serviceable under Canadian conditions, so that the meter could be tested without breaking the seal. He had found that the meter-testing devices had introduced economy in some of the smaller companies and that testing could be done by one man instead of two, resulting in a greater number of meters tested per man.

Mr. Wallau, of Cleveland, referred to the use of a current-limiting device on circuits having a service charge only, and pointed out that the Ohio Public Service Commission was opposed to such devices.

O. J. Bushnell had not found that such devices would reduce the expenses on

small consumers when the expense of the device was considered. Meters are usually left in premises permanently, the current being merely cut off when one tenant goes out until a new one comes in. He thought that the devices were more advantageous on large meters which were tested frequently.

P. Junkersfeld referred to the installation of meters outdoors in Victoria.

Mr. Jenkenson, of Vancouver, B. C., thought such installations were made to facilitate meter reading but considered it very objectionable and did not follow it in his work in Vancouver. The meter deteriorates rapidly when exposed.

Mr. Henkle, of Portland, Ore., agreed with Mr. Bushnell. He considered $13 an excessive cost for mere installation.

Mr. Vaughn, of Schenectady, referred to the similar practice of installing meters outdoors in the Southern States.

Mr. Hamilton, of Portland, Ore., described similar protective devices which have been improvised and used in Portland. He referred to difficulties which had come through having the circuit protected up to the meter and the fuses sealed, since when these fuses were blown, customers would break the seal in order to replace them. While the company did not like this practice, it had not felt justified in prosecuting the offenders, as delay would often be occasioned if the customer had to wait until a company representative came to replace the fuses.

The report of the Committee on Grounding Secondaries was next presented by the chairman, W. H. Blood, Jr.

The report refers to the fact that all previous committees have strongly recommended the grounding of secondary alternating-current circuits which carry not more than 150 volts. The Electrical Committee of the National Fire Protection Association has approved a recommendation for compulsory grounding up to 150 volts, and permissible grounding above that value. This will be acted upon in 1913 and will probably be adopted in the National Electrical Code for that year. Companies have nearly a year in which to conform to this practice, which is generally recognized as the best engineering. The kind of ground connection is then briefly considered, it being generally agreed that a water-pipe system is the most permanent and effective. Stress is laid upon the importance of a good ground, as a high-resistance ground may be worse than none at all, and the committee cautions against the use of devices on the market which give uncertain protection. It recommends that operating companies keep accurate records of tests on different kinds of grounds in different soils and at different times of the year, in order that accurate data may be available in the future.

Farley Osgood urged the operating companies to begin compliance with the new rule at once in order to avoid excessive expense in case the grounding was later made compulsory, and that also all new installations be grounded at once so as to put them in excellent legal position in case of any action. He offered a resolution that the report be referred to the executive session for favorable action. This was unanimously carried.

The report of the Lamp Committee was next presented by W. W. Freeman, in the absence of the chairman, F. W. Smith.

This report gives a summary of previous work of the committee and calls attention to the increase of the total output of incandescent lamps, which, for 1911, was 8.45 per cent. The proportion of carbon lamps has been steadily decreasing since 1907, while the Gem and tungsten lamps have increased. The proportion of tantalum lamps shows a slight falling off from 1910, the percentage of the total being 2.7 as against 19.0 for Gem, 25.4 for tungsten, and 52.9 for carbon. It is expected that the proportional output of carbon and tantalum lamps will still further decrease. The committee recommends the adoption of the Gem lamp in place of carbon lamps. The strength of both drawn-wire and wire-type tungsten lamps has been greatly increased and these types now give general satisfaction. Very recently a marked improvement in the larger sizes of tungsten lamps has been made, permitting their standardization at one watt per candle, with a useful life of 1,000 hours. Sign lighting has been stimulated by the use of special tungsten sign lamps. A list is given of the new types of lamps which have been standardized, and the new selling plans and prices of the manufacturers are referred to. The practice of introducing the tungsten lamp by wiring campaigns is increasing and secures a class of business difficult to obtain under ordinary methods. The committee urges a liberal policy in order to encourage the use of tungsten lamps.

N. W. Leidy said that the early difficulty in the manufacture of the Gem lamp had been overcome and it was now equal to the carbon lamp in maintenance of candlepower. The reduction in its cost should make it the standard lamp and bring about the rapid elimination of the carbon lamp. He expected still further improvements in tungsten lamps in life and efficiency. They should have a still wider field for use in minor street lighting. The striving after high efficiency rather than longer life has somewhat delayed the application of free lamp renewals in the case of tungsten lamps, which is somewhat unfortunate.

John W. Howell pointed out the limitations of the Gem lamp, which is less suited for very large or very small sizes than the tungsten lamp, that is, above 100 watts and below 30 watts. The new 15-watt tungsten lamp is very good. Ten-watt lamps are now being made and will soon be listed. The cost of the tungsten lamp will come down still fhrther and its ruggedness has been greatly increased. Tungsten lamps are now being packed without cotton batting. Improvements now being made will make the tungsten lamp just as strong as the carbon lamp and it will be packed and shipped in just the same way. As soon as the price goes down a little further the Gem lamp will follow the carbon lamp into oblivion. Now that tungsten wire can be drawn uniformly to the desired size the lamps themselves will be more uniform and all sign lamps will be made of one size of wire, so that they can be connected in series without difficulty. Similarly, street series tungsten will be made of one size of wire and will all have the same rating, so that it will not be necessary to select lamps for use in series. In a few years the tungsten lamp will be used for every purpose.

The report of the Committee on Electrical Measurements and Values was presented by Mr. Howell, in the absence of the chairman, Dr. Kennelly.

This report deals with the changes in the units of candlepower, voltage and power which have occurred during the past three years, due to the fact that the Bureau of Standards has changed the value which it assigns to the Weston cell from 1.0191 to 1.0183 volts at 20 degrees centigrade, and has lowered its unit of candlepower by 1.6 per cent to bring it into conformity with the values used in France and Great Britain. The effect of these changes upon the incandescent lamp is noted. The change in candlepower results in an increase in the serviceable life of about 7 per cent for lamps made to the new standard. The direction of the effect produced by the change in the unit of voltage is opposed to that produced by the change in the unit of candlepower. The same nominal voltage applied to a lamp, according to the new unit, increases the candlepower by about 0.5 per cent.

This report was discussed by Mr. Leidy and Clayton H. Sharp.

M. D. Cooper then presented a paper by himself and R. E. Campbell entitled "The Proper Lamp for a Circuit," after which the session adjourned.

The authors have studied the causes for departures from nominal voltage on lamp circuits, and the means of rectifying them, classifying the different conditions influencing the selection of a proper lamp under the heads of plant operation, transmission, and translation of energy into light. The proper lamp is one which will give the desired intensity and proper quality of illumination, the minimum fluctuation of intensity and the maximum economy. The last two conditions are treated at length. The volt rating for the lamp which should be selected is carefully studied. For fluctuating voltages, it should be such as to give the same life as the steady voltage, and this is approximately the average voltage. Lower voltage on the line than the lamp rating means decreased revenue to the central station and decreased light and dissatisfaction to the customer. Tables are given showing the cost to the customer at different rates for energy and different voltages and it is demonstrated that it is advantageous to both central station and customer, at usual rates, to operate lamps at a voltage several per cent above their rating. With free renewals, the most profitable voltage for

the central station is less, but is higher than the rated voltage.

Second Technical Session.

The second technical session was called to order by F. M. Tait on Wednesday morning and the report of the Committee on Terminology was presented by W. H. Gardiner, Jr.

Report on Terminology.

The committee submitted a list of terms, the definitions of which it has drawn up. It confined itself to the definition of terms directly pertaining to the central-station business rather than broadening its field to include the consideration of terms of a scientific and physical nature, which it felt were best handled by the committee of the American Institute of Electrical Engineers. The committee also drew up some definitions of various rate terms which in essence coincide with the definitions which have been adopted by the Rate Research Committee. The latter are appended to the list.

This was followed by a paper by F. N. Jewett entitled "New Current-Consuming Devices."

This paper describes devices recently brought out by the Wagner Electric Manufacturing Company, including a single-phase rotary convertor suitable for battery charging, X-ray work, telegraph and signal work, etc.; and a single-phase mechanical rectifier which can be used for similar purposes where only a small current is required. This has already been described in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN.

The next paper, by Taliaferro Milton, entitled "Twenty-four-Hour Service in Small Central Stations," was, in the absence of the author, presented by George R. Murphy.

It is becoming more and more difficult to obtain customers for a central station in small towns unless 24-hour service is furnished. Such continuous service is unprofitable in many cases, where the day load would not warrant keeping the generators in continuous service with men always on duty at profitable load. The author advocates the use of a direct-current, two-wire or three-wire system in such small towns with a short radius of distribution, and the installation of a storage battery for carrying the load from midnight until 4 p. m. Charging the battery during the operating time improves the load-factor at that time and decreases the generating cost per kilowatt-hour sufficiently to make the increased coal consumption very small; consequently the added revenue is obtained almost solely from the first cost of the battery investment. In this manner 24-hour service is supplied with only one labor shift. Battery plates can be installed in tanks of sufficient size to allow for increasing the capacity as the load requires.

J. C. Naylor told his experience with a small plant at Goldendale, Wash., where he took charge one year ago and instituted 24-hour service, with the result that the number of customers had been more than doubled and the service charge on motor connections covered fixed charges of the plant, which is water-driven.

Farley Osgood considered it advisable to make an original installation which would suit final conditions and be able to take care of long-distance work, with the possibility of connection to a network of other towns. He was, therefore, opposed to a direct-current system. The life of the storage battery depends largely upon proper attention, without which it soon goes to ruin. In a steam-driven plant the cost of 24-hour service is much greater than in a water-driven plant, such as that of Mr. Naylor. The steam-driven plant will require a good commercial campaign for about two years after changing to all-day service before it will pay.

Godfrey Atkin told of plants which had successfully used batteries and stated that the remarks of Mr. Osgood did not apply to conditions in the West.

F. N. Jewett quoted the opinions which he had heard expressed at many state conventions that many small plants were unprofitable until they provided all-day service. The numerous household appliances had constituted a profitable load. In some cases the plants ran at first all-day only one day in the week, and later extended the service.

The report of the Committee on Overhead Line Construction was next presented by Farley Osgood.

Legal counsel for the Association has reported that there would be no retroactive effect of the specifications adopted last year, and the Executive Committee approved the report in December. The Association of Railway Telegraph Superintendents adopted the report verbatim in the place of the one in preparation by its own committee. The American Electrical Railway Association also approved the report in technical session and the Standards Committee recommended the addition of two or three phases of an explanatory nature. This will not make any material alteration. It will probably be adopted at the convention in Chicago next fall. The American Railway Engineering Association desires to make a number of changes which will make the rules more stringent. At the convention in Chicago last March the result of the discussions was to change only one section, the eighteenth, relating to putting strain insulators in guy wires, which was considered objectionable. The N. E. L. A. Committee agreed to this change, which provides that strain insulators shall be used in guys from wooden poles carrying power wires up to 600 volts, providing the guys are not grounded to permanently damp earth. For voltages above 600, strain insulators shall not be used in guying steel structures or wooden poles if the guys are grounded to permanently damp earth. The Committee offered an interpretation of the specification regarding the use of a clamping device on 2,400-volt service, in paragraph 1 of Section IV: "The tie form of construction is proper for all 2,400-volt railroad crossings provided the construction conforms to the requirements of Section I, which applies only to voltages and conditions as covered therein where crossing span does not exceed 125 feet."

Mr. Wilson called attention to the fact that California has certain legislative enactments which require two strain insulators on all guys. Mr. Lighthipe, of Los Angeles, stated that in agreements with the Santa Fe and Southern Pacific Railroads modification was made to conform to these laws, so that there was no trouble on that account.

Farley Osgood stated that any state or local requirements which conflicted with the specifications would, of course, have to be followed. He moved the adoption of the change in Section 18, which was carried. A motion was also passed stating that the interpretation of Section 4 given above was the sense of the meeting. Mr. Osgood then referred to tests made on the Pennsylvania Railroad, which had previously required clamp devices on all voltages above 2,000. After these tests had been made, by cutting the wires back of the span section, the requirement was rescinded.

Third Session.

President John F. Gilchrist, called the third technical session to order on Thursday morning. The report of the Committee on Prime Movers was presented by J. B. Klumpp.

The report discusses water power, steam and gas. Under water power, the relative merits of vertical and horizontal units are discussed. Testing of water wheels in place is recommended, with some suggestions as to the method to be used. Governors and safety devices to prevent runaways, materials for penstocks, and, under the head of measuring water, a very interesting device is described which is suitable for moderate flows. The advantages of storage reservoirs and steam-power auxiliaries are discussed. Under steam power some recommendations are given for the purchase of coal on an ash basis. Mention is made of a boiler installation of unusual-sized units in Detroit. Mechanical stokers and steam-flow meters are discussed at some length. Some extended notes are given on the use of cast iron in connection with superheated steam. A brief mention is made of a new type of boiler using the principle of surface combustion, as well as of some of the new forms of high-efficiency reciprocating steam units which are being exploited abroad. The development of the steam turbine during the past year is described. Under gas power condensed statistics from the United States Government reports are given, showing approximately the existing status of fuel-oil supply; also oil specifications for fuel adapted to the different types of engines. The primary features of the oil engines are described and a list of builders given, with results from oil-engine plants, including operating costs. Reference is made to some of the principal improvements in gas-engine design during the past year. A short description is given of the unique Humphreys gas pump, together with a scheme for its application to a steamplant.

B. J. Denman stated that the high efficiency attained by the large boilers at Detroit was not due to fuel or successful firing, but to the design of the boiler, which provides an unusual

combustion chamber, a very long passage for the gases, and small radiation losses on account of the small inclosing wall surface. The large grate with uniform fuel bed also contributes to high efficiency. The efficiency curve is very flat, dropping from 80 per cent at rating to 74 per cent at double rating. The cost per horsepower is about the same as for other boilers, but there is a marked reduction in cost of setting, piping, etc.

P. Junkersfeld spoke of the great advantages of the steam-flow meter, lack of which has left steam generation in a rather chaotic condition until the present time. Every boiler should be metered just as much as every generator connected in parallel.

C. W. Stone spoke of the great advantages accruing from the use of steam-flow meters. He emphasized the importance of the Humphrey pump.

Mr. Yawger, of Rochester, gave his experiences in using oil-burning equipment under boilers. He found that about 25 per cent of the steam generated was required for vaporizing the oil, and the output of the boilers was not as great with oil burning as previously with coal.

Mr. Lighthipe said that nearly all of the plants in Southern California use crude oil for fuel. The steam consumption for atomizing the oil varies from two to five per cent. He expects this to be reduced to one per cent.

L. H. Egan has oil-burning equipment under 8,000-horsepower boilers. Tests showed that five per cent of the steam was required for the oil-burning equipment.

L. L. Elden then presented the report of the Committee on Electrical Apparatus.

The committee describes apparatus, etc., in 22 different classes, in an effort to illustrate the state of the art. It calls particular attention to the following developments: (1) The demand for better economy has led to still higher speeds, in the operation of steam turbines, and very satisfactory results with such generators have been reported in several instances. Special care should be given to specifications for such generators to insure safe and reliable operation, particularly in connection with reactance, temperature rise, ventilation and ruggedness. (2) The great economic advantages of concentration in power production and power distribution in large areas are becoming better known and much progress is being made in this direction. This results in a still more insistent demand for universal transmission systems capable of supplying electric power for every possible purpose. This condition makes an increasingly strong demand for 60-cycle rotary converter to supply power for railway purposes. (3) The developments during the year also indicate a demand for simpler and more rugged switchboard equipment in substations, particularly small stepdown transformer substations where intermittent attendance is all that can be afforded. So-called iron-clad switchgear has been used abroad to some extent and is also being favorably considered in this country. A table is given of standard practice in the equipment of a switchboard with instruments.

C. W. Stone referred to substation apparatus for both lighting and railway service. He advocated the use of a uniform type of machine for 300 volts, which could be connected in parallel for lighting service and in series for railway service. Transformers above 75,000 volts should be used only on an isolated delta system and not as a grounded star. Reliable fuses are now available for voltage up to 20,000 for potential transformers.

W. N. Ryerson disagreed with the committee as to the advisability of using reverse-current relays on exciters. He preferred to tie the exciters directly to the busbars. He considered the list of switchboard instruments given by the committee unnecessarily large.

Messrs. Yawger, Hayes and Edden also joined in the discussion.

The report of the Committee on Underground Construction was then presented by W. L. Abbott.

The report deals especially with the following items; alternating-current underground distribution, manhole construction, electrolysis and high-tension cable data and specifications. Details are considered under each of these heads, with a tabulation of data from a large number of operating companies. The matter of keeping complete records of subway equipment is very important and it is the duty of every company to keep a system of records covering such installations. The remedial measures for overcoming electrolysis are considered in detail. A standard form of specification for paper-insulated high-tension cable is given.

L. L. Elden opened the discussion by speaking very favorably of the report and the matter of the subjects dealt with. Conduit construction should include all known protective features to forestall troubles from electrolysis, mechanical injuries, the spread of burn-outs to other cables, etc. Ducts should be spread when entering manholes to facilitate easy racking and eliminate short bends. Bonding between cable sheaths and railway returns often gave success in localities where there is dry soil, but not in abnormally wet locations.

John F. Gilchrist referred to the electrolysis situation in Chicago, where a study had shown that a drainage system costing about $300,000 would eliminate 90 per cent of the trouble.

F. C. Lindsay stated that experiments were being carried on in Seattle to compile data on the temperatures of underground cables.

C. J. Wilson told of junction boxes for high-tension cables which were in use in San Francisco. These are used up to 4,000 volts. Manufacturing companies have taken the matter up and such boxes will soon be on the market.

Mr. Northmore, of Los Angeles, emphasized the unreliability of fuses for use in underground units. These have caused fully 90 per cent of the underground troubles in Los Angeles. Inclosed fuses do not seem to work successfully.

W. L. Abbott closed the discussion, stating that two-part manholes are desirable, but objectionable from the standpoint of cost. The committee had failed to find any good form of high-tension junction boxes and thought that a suitable one would be very expensive.

A paper was then read by W. M. McConahey on "Care and Operation of Transformers," after which the meeting adjourned.

Large high-voltage transformers such as are generally used for power transmission require reasonable care to give satisfactory service. It will not do to operate them year after year without attention. The higher the voltage the more important is careful and intelligent inspection. The two essentials in the design of transformers are insulation and heating. The operating man must do his share toward maintaining the insulation in good condition and preventing excessive heating. Formerly transformers and tanks were shipped separately, but now the transformer is usually shipped complete with tank and oil. This prevents moisture from getting into the insulation during transit. It is very necessary to have dry oil and the oil should be tested before placing the transformer in operation. Covers should also be tight to exclude dirt. Periodical inspection with a test of oil drawn from the bottom of the tank should be made every six months. If the oil is dirty it should be filtered, and if it contains moisture it should be dried, the filter-press type of dryer being recommended by the author. The question of temperature rise was then considered. Self-cooling transformers are now built up to 2,000 or 3,000 kilowatts, depending upon the voltage and frequency. Water-cooled and air-blast transformers were next considered. The limiting voltage for the latter is 35,000 volts. While oil-cooled transformers will stand considerable overload, air-blast transformers cannot safely carry a heavy overload for more than a few minutes. Consideration is then given to the polarity of transformers and the possible combination on three-phase circuits. Transformers connected delta-delta cannot be made to parallel those connected delta-star or star-delta, but one connected delta-star can be paralleled with certain combinations of one connected star-delta. For perfect parallel operation of two transformers they should have the same ratio of turns, the same resistance drop and the same inductive drop. It is not easy for manufacturers to design different sizes meeting these conditions, especially when tap voltages have to be considered.

Power Transmission Sessions.

The first session of the Power Transmission Section was held on Tuesday evening with Chairman Henry L. Doherty presiding. The first thing on the program was the reading of the chairman's annual address, during which Mr. Blood took the chair.

Chairman Doherty's Address.

The address of Mr. Doherty opened with a review of the purposes of the Power Transmission Section, which was organized at the St. Louis convention of 1910. Some 30,000,000 horsepower lies dormant in the undeveloped water powers of this country. Much of this power lies remote from existing markets, but many industries require cheap power more than favorable geographical location and in irrigation by electric pumping there is a but little developed field relatively near many water sites. Many such possible demands do not require uninterrupted service, so that economy in line construction can be exercised in the pioneer development work. A problem of great importance is the economical transmission of electrical energy to farms. There is bound to be a tremendous increase in the demand for electric power in agricultural districts, even the lighting of country roads may be not far off. However, the greatest obstacle to the development of water power is the attitude of the United States Government. Under the guise of conservation of resources areas 100 times greater than the state of Rhode Island have been withdrawn from entry. Instead of stimulating water-power development it has been hampered by mistaken theories with the result that millions of tons of coal have had to be used to supply energy that should have been hydroelectric. Vast regions remain undeveloped because railroads cannot be built through districts that the government does not allow to be rendered productive and profitable. This absurd policy is the result of national hysteria that has been fomented by unscrupulous demagogues, impractical dreamers and selfish muck-rakers, all of whom were forcibly denounced by Mr. Doherty.

A paper prepared by C. H. Williams, of the Northern Colorado Power Company, was presented in abstract by A. W. Hahn. The paper was illustrated by a long film of interesting motion pictures.

Electricity for Irrigation and Farm Use.

Mr. Williams' paper embodies a very thorough study of the use of electricity on typical western farms, particularly such as those in Colorado and Wyoming, where irrigation must be resorted to because of the deficiency in rainfall. In all gravity irrigation work there are very great losses of water by evaporation and seepage along the canals and ditches, so that but a small part of the water diverted from a reservoir or stream actually reaches the farm. Taking up irrigation by pumping, Mr. Williams discusses the source of underground waters and the method of measurement and shows that it is necessary to supply annually less than one acre-foot of water in excess of the 14 inches of yearly rainfall prevalent there. He explains what is considered the proper rotation of crops and when and how the water must be applied for potatoes, wheat, alfalfa and beets. He describes in some detail the construction of wells, both of the open and drilled types. The Northern Colorado Power Company, which supplies a great deal of power for irrigation pumping, will probably offer to put down and guarantee wells. Centrifugal pumps are almost always used. Electricity for pumping is the most reliable source of power and usually the cheapest, even as compared with windmills. The cost of a typical electric pumping plant is given and it is shown that the total operating and fixed charges are less than with ditch irrigation. Moreover, the water is available just when needed and is not contaminated. Pumping business has had an admirable effect on both the daily and annual load curves. Aside from pumping there are many uses for electricity on the farm. Of these the chief one is for cutting and grinding feed for stock. After harvesting is over farmers find it profitable to engage in systematic feeding of range cattle for the market. The methods of feeding and of grinding and mixing the feed are described, also the results achieved. On the dairy farm also there is considerable demand for electric power, particularly for driving the ensilage cutter, vacuum cattle cleaner, cow-milking machine, etc.

The discussion was opened by a series of questions propounded by Messrs. Donlan, Wallau, McGee and PenDell.

John A. Britton, of San Francisco, told of irrigation pumping done by the Pacific Gas & Electric Company. Its annual load-factor last year was 72 per cent; that of San Francisco alone averages 55 per cent. About 15,000,000 acres of land contiguous to its system is capable of irrigation development. A campaign for power supply for this purpose was undertaken three years ago and now some 25,000 horsepower in motor-driven pumps is connected to the lines. The University of California and the Southern Pacific Railroad have cooperated in an annual demonstration train that travels over practically all the state. As the result of this work and the continual campaign maintained by the Pacific Gas & Electric Company, the fruit farmers are gradually learning how they can greatly increase their crop by electrically pumped irrigating water.

Samuel Insull, of Chicago, stated that great possibilities exist in the supply of electric power to farming districts, in the Central West as well as on the Coast. Urban stations can afford to extend their lines into the country and develop an excellent summer load. From his own experience he found the gasoline engine to be a curse to the farmers. The latter must be taught to appreciate the reliability and convenience of electric power.

J. E. Davidson, of Portland, Ore., described the pumping work done in the Yakima and Columbia valleys where some 250 farm pumps are supplied, ranging from two to nine horsepower each. Both flat rate and meter charges are employed, the former being $30 to $42 per horsepower for a six-months' season.

Henry L. Doherty, of New York, declared that many hydroelectric projects that seemed impracticable for want of power demand can be put in on a profitable basis by the development of irrigation-pumping load. Thirty to sixty-foot wells are not the limit to practical electric pumping, if the land is sufficiently valuable. In some cases the water is worth ten times as much for irrigation as for power development. Much rich land lying in the upper parts of a river valley can be made productive by pumping from the river.

John C. Hays, of Visalia, Cal., said that the Mt. Whitney Power Company is almost exclusively an irrigation company, 90 per cent of its output being used for such pumping. The winter peak is only seven-tenths that in summer. The business is now growing at the rate of 25 per cent a year. Most of the pumping is in orange groves, these yielding on the average $250 per acre net. The depth of the wells ranges from almost nothing to 460 feet.

Mr. Kingman stated that in the Yakima apple districts the pump lift ranges from 150 to 200 feet. The well water is of more equable temperature than ditch water.

R. H. Ballard, of Los Angeles, spoke of irrigation pumping in his vicinity, where 25,000 horsepower is so employed and told some amusing incidents in doing away with gasoline-engine competition.

Mr. Hahn then closed the discussion by answering the numerous questions that had been put. Vertical motors have not been used for such pumping, to his knowledge. Most of the pumps are specially fitted for the conditions and most run at 1,120 revolutions per minute. The largest well irrigates 320 acres; it seems to have an inexhaustible supply.

Second Power Transmission Session.

The second sesion of the Power Transmission Section was held on Wednesday afternoon. Chairman H. L. Doherty brought up the suggestion that the name of the section be changed to Hydroelectric and Transmission Section, which on motion of Mr. Gille was unanimously ordered. A Nominating Committee, consisting of Henry L. Doherty, John A. Britton and P. T. Hanscom, was then appointed.

A paper by John C. Hoyt, of Washington, D. C., on "Work and Publications of the United States Government Relating to Hydroelectric Development," was read by Glenn L. Parker.

Government Publications on Hydroelectric Development.

Mr. Hoyt's paper calls attention to the vast amount of data collected by various government departments, bureaus, and commissions that are available for the use of engineers and those contemplating the development of hydroelectric projects. Unfortunately much of this data does not seem to be known to many engineers. Mr. Hoyt showed how the numerous reports giving data and information collected by these various government sources may be obtained and where copies of them are available for reference.

Discussion on this paper was opened by Mr. Jacobs, of Seattle, who expressed his surprise that so few engineers are familiar with the data collected by government bureaus. The chief criticism of this work that he offered was that it should be more extensive. The federal and state bureaus whose duty it is to carry on such work appreciate this shortcoming, but they are continually hampered by lack of the requisite appropriations to permit extending the investigations.

John A. Britton said the Pacific Gas & Electric Company found the government topographical maps of great service.

Henry L. Doherty called attention to the need for accurate data on stream run-off as well as rainfall in order to to design properly any water-power works. Rainfall records usually extend back much further than those of stream flow.

W. N. Ryerson, of Duluth, said that in Minnesota the state and federal governments and hydroelectric companies are co-operating in securing all the data possible.

Mr. Parker closed the discussion by stating that for several years the cooperation of hydroelectric companies and all other agencies has been sought in systematic observations of rainfall and stream run-off. Only last year the United States Geological Survey completed flow data and equal run-off curves of the whole country.

The report of the Power Transmission Committee was then presented by D. B. Rushmore on behalf of the chairman, J. R. McKee, who was unable to be present.

Report of Power Transmission Committee.

The Federal Government's withdrawal from entry of public lands on which there was a possibility of a power site, was submitted to the committee for discussion and suggestion as to under what conditions capital might be induced to develop these sites if they were restored. It was recommended that all franchises for such developments should be indeterminate in length, rates being regulated by some federal or state commission. Politics under the guise of so-called conservation complicates the situation and makes it almost impossible to get fair remedial legislation. As a result millions of acres of public lands in the West are still withdrawn and power development has greatly diminished there. An extract from the report of Secretary of the Interior Walter L. Fisher is given to show that the revocable permits now allowed are unsound, both in principle and practice, because capital will not risk its investments on a tenure revocable at discretion. An extract from President Taft's message points out that it is time to call a halt in general rhapsodies over conservation and to get down to a consideration of specific evils and specific remedies that the conservationists have to offer. The report then discusses the situation at Niagara Falls as typical of misdirected conservation zeal. By the diversion here of 20,000 second-feet in addition to the maximum now authorized, it would be possible to develop 500,000 horsepower without appreciable effect on the Falls, but, valuing this at $20 per horsepower, adding $10,000,000 annually to world's wealth. The public has no conception of the waste of power going on at undeveloped water-power sites. If this is forcibly brought to public attention and particularly if impressed on our legislators and congressmen, some sensible legislation should be brought forth.

Directly after the reading of the Power Transmission Committee's report, Mr. Tait, who was presiding at the time, asked Mr. Doherty to supplement the report by reading again the latter part of his annual address that had been presented on the preceding evening. Before doing so Mr. Doherty stated he had been accused of using intemperate language in that part of his address commenting on the conservation attitude of the United States Government. He felt warranted in making emphatic statements because he was convinced that those who are exploiting the present policy are doing so merely in order to raise a public issue. He narrated an incident that happened to him in Germany a few years ago which showed that the foreign bankers had instilled in them a distrust of American business men because of the wild speeches of many of our public officials and the muck-raking articles in our publications. Mr. Doherty then read the concluding part of his address.

Judge Richard A. Ballinger, formerly Secretary of the Interior, was then called on to address the section. He traced the development of the public lands that began in the sixties with the enactment of the liberal homestead and other acts and that brought about the rapid growth of practically all the West. It was not contemplated that the Federal Government should stay in the public-land business or become a landlord and develop its own resources in competition with those developments already made privately. Each state on its entry into the Union was given the same privilege of disposing of its public lands and resources to bring about its best development. Suddenly the western states are hampered in this work. The speaker felt that the Federal Government should delegate the disposal of the public lands to each commonwealth as it best saw fit to develop its resources. The states are competent to do this, in fact, are more cognizant of their needs than the bureaucratic officials in Washington, D. C. A bill to release the power sites to the states received violent opposition from these same officials because of their reluctance to relinquish control. By a reasonable development of the water powers of the country probably one-third of its coal consumption could be saved. Similar hampering of local development has resulted from the withdrawal of forest and coal lands. Enormous tracts of public land in the far western states (in many cases in the middle thereof) remain as barriers to the legitimate development of railroads, canals, highways, power and irrigation projects. Such barriers are not only stifling development, but are driving capital and thrifty people to other lands. A strong appeal to Congress for the necessary remedial legislation is imperatively needed.

John A. Britton strongly indorsed the views of Judge Ballinger and called attention to the fact that but 350,000 of the nearly 6,000,000 horsepower available has as yet been hydroelectrically developed on the Pacific Coast. He made an earnest plea for assistance from all parts of the country in laying the situation before Congress in its true light.

D. B. Rushmore closed the discussion by calling attention to the ignorance of the requirements for water-power development possessed by many public officials by whose authority restrictions have been imposed. Assuming that their intentions are good, the attitude of the reformers and muck-raking publications can be explained only by similar ignorance. Therefore a campaign of publicity and of educational work, among legislators especially, must be undertaken without delay.

The second part of the report of T. C. Martin, as chairman of the Committee on Progress, was presented and accepted.

Progress.

The second part of Mr. Martin's report on progress, dealing with advances made in power transmission, hydroelectric development, and kindred subjects, is quite comprehensive. It opens with a discussion of some of the legislative aspects of power development, particularly the restrictions on such development that there is a tendency to impose in the name of conservation of national resources. The absurdity of the views very generally held in regard to water-power development are pointed out. Mr. Martin then calls attention to the water-power law enacted in Wisconsin last year, and which has been nullified by a decision of the Supreme Court of that state, which held to the principle that water-power rights accrue to ripar-

ian owners and cannot be confiscated by the state without the proper exercise of the right of eminent domain. A number of combined steam and hydroelectric plants are referred to as showing the need for steam auxiliaries in connection with most hydroelectric projects. Mr. Martin then discusses the rapidly increasing use of very high voltages for transmission. At least half a dozen systems are now operating at over 100,000 volts in this country. The results show that such high voltages give rise to no more trouble than the medium voltages that were formerly regarded as being the limit for transmission service. This is due to the very satisfactory results following the use of suspension-type insulators. There is but one 110,000-volt line as yet in service elsewhere than in this country and Canada; this line, at Lauchhammer, Germany, is briefly described. The 140,000-volt system that has been put in service at the Au Sable plant in Michigan is described. The report is concluded with interesting comments on some new projects now under contsruction.

A paper on "Switchboard Practice for High-Tension Transmission" was then read by Stephen Q. Hayes, of Pittsburgh, Pa.

High-Tension Switchboard Practice.

Mr. Hayes' paper gives a review of recent developments in switching equipment for high-tension stations. In the generating stations the switchboards are usually of three types. A panel type is used where it is desired to mount the instruments for generators, transformers, etc., on the same panel as the control devices. A pedestal type is used where it is desired to have the complete switching equipment for each generator an entirely independent unit; in this case the control devices are placed on the pedestal and the instruments on a separate framework nearby. The desk or bench-board type, which is most commonly used in American high-tension plants, permits the reduction of the length of the operating board to a minimum. The outdoor circuit-breaker has been developed very satisfactorily and is employed on circuits as high as 100,000 volts. For very high voltages disconnecting switches are mounted on pillar-type insulators so arranged that they can be mechanically rotated. Lightning arresters of the electrolytic type are now almost invariably used for the protection of very high-tension circuits. Choke coils of special design are also employed. In the station wiring copper tubular busbars are generally used; 100,000-volt busbars are frequently hung by means of suspension insulators attached to the roof girders. Outdoor substations are coming into more general use, as they eliminate the need for building expenses.

A. J. Bowie, of San Francisco, spoke of the desirability of the air-break switch for outdoor high-tension service. Oil switches must be frequently examined and it is not practicable to do this outdoors where there is moisture about. The air switch is cheap in initial cost and maintenance and requires no housing whatever. Such switches should be liberally supplied wherever in case of accident the damage can thereby be minimized.

D. F. McGee, of Portland, asked regarding the practicability of outdoor transformers in districts where severe cold, sleet and snow abound.

D. B. Rushmore, of Schenectady, N. Y., said outdoor substations are practical under the most adverse weather conditions. They permit a low investment charge. He felt that the introduction of 100,000 volts and over threw an enormous strain on the high-tension apparatus and required special operating practice.

Mr. Peart, of Fresno, Cal., gave some interesting experiences with outdoor transformers that were exposed frequently to temperatures as high as 107 Fahrenheit.

Mr. Hayes closed the discussion briefly, indorsing the statements of Messrs. Rushmore and Bowie respecting the ability of the outdoor transformer to withstand severe climatic conditions.

Third Power Transmission Session.

The third power transmission session was called to order by H. L. Doherty, chairman, at 2:30, o'clock, Thursday afternoon. The report of the Committee on Receiving Apparatus for Use on Transmission Lines, F. B. H. Paine, chairman, was read by W. N. Ryerson.

Receiving Apparatus.

The report of the Committee on Receiving Apparatus for Use on Transmission Lines, although rather brief, lays great stress on the need for a careful analysis of all disturbances of continuity of service. A method is explained for keeping systematic record of such disturbances. Among the recommendations of the committee are that equipment should not be cut out until it has to be cut out; inverse-time-limit relays should not be permitted; where maximum continuity of service is extremely inportant induction motors should be used instead of synchronous machines. Improvement of the continuous performance of synchronous apparatus usually results from having separate excitation, as from a storage battery or special exciter. Heavy copper dampers should be employed on the pole faces of rotary converters and synchronous motors.

After reading the report Mr. Ryerson moved the appointment of a similar committee for the ensuing year. This motion was carried.

Opening the discussion Mr. Rushmore called attention to the difficulties involved in tying together systems of different voltages and frequencies, and the expense involved in securing proper receiving and converting equipment and adequate protection and safety devices.

J. A. Lighthipe, Los Angeles, related the experience of the Southern California Edison Company with breakdown and deterioration of insulators, particularly of the old pin type. They have made all kinds of tests and the manufacturers have advanced a great many theories and suggestions, but the only cure seems to be to rebuild the line with the suspension-type insulator.

P. T. Hanscom, San Francisco, expressed the opinion that the breakdown was caused by a combination of electrical and mechanical stress, and that something could be accomplished if a more liberal use were made of insulator units in meeting the mechanical requirements.

The paper entitled "Corona on High-Tension Lines," by G. Faccioli, was read by E. F. Gehrkens, Pittsfield, Mass.

Corona in High-Tension Lines.

Mr. Faccioli's paper opens with a consideration of the dangers connected with the corona phenomenon, which usually shows weak points in a high-tension system and may cause decay of the insulation and even of the conductors. Although the phenomenon is quite complex, much investigation has been made of it. Losses always accompany corona, but by proper selection of the diameter and spacing of conductors these losses may be eliminated. Corona appear first at sharp bends, also where dust or dirt are found on the conductors; the latter cause usually becomes negligible by the dissipation of the dust. Increasing the diameter of the wire or placing disks or spheres on it decreases the tendency to corona formation. The paper closes with a brief description of the 140,000-volt system of the Au Sable Electric Company in Michigan and of the very successful operation of this highest voltage in the world. Local corona appear on the lines at 134,000 volts and complete corona at 155,000 volts. When 140,000 volts is maintained throughout the 125 miles of line there is a loss of about 6 kilowatts per mile and a faint noise is heard at the middle of the long spans.

Mr. Rushmore supplemented the reading of the paper by an analytical comment upon the phenomena attending the demonstration of corona, and the subject was discussed to some extent by Messrs. Hanscom, Hayes, Winns, Kerr, Cheney, Stone and Bowie.

The nominating committee presented the names of officers for the ensuing year, and the following were unanimously elected:

Chairman, W. N. Ryerson, Duluth.

First vice-chairman, D. B. Rushmore, Schenectady.

Second vice-chairman, P. M. Lincoln, Pittsburgh.

Secretary, Farley Osgood, Newark.

Executive committee, J. A. Lighthipe, Los Angeles; H. A. Lardner, San Francisco; D. L. Huntington, Spokane; P. T. Hanscom, San Francisco; H. T. Porter, Montgomery, Ala.; J. F. Vaughan, Boston; P. G. Gossler, New York; W. R. Thompson, Chicago; R. D. Mershon, New York; F. B. H. Paine, Buffalo.

The report of the "Committee on Protection from Lightning," S. D.

Sprong, chairman, was read by H. B. Gear, Chicago.

The committee has given particular consideration to the question of ways and means to carry on work in this line. The most pressing need at present is for trained observation and analysis by experts of the records collected and methods in use by the various companies, and it recommends that such an expert be employed for the purpose of visiting representative systems to analyze reports and offer suggestions as to methods. This applies particularly to transmission companies, most of which realize the importance of the work remaining to be done. There are a number of important problems which are still unsolved. One of these is the subject of overhead ground wires.

Mr. Rushmore called attention to the desirability of large transmission systems establishing records through expert investigators, to work in conjunction with the association and the manufacturers of protective apparatus for a more rapid advancement in this.

Mr. Gear said the committee should devote some study to the protection of distribution and transmission systems.

Some larger companies have been keeping records for several years past on the rate of loss of transformers and some very definite experiments are in progress in Chicago with reference to the protection of circuits with different makes of lightning arresters. One entire group of circuits is equipped complete with one kind of arrester; another group is equipped with another kind, and another with still a third kind; another circuit, which is a three-phase circuit, is equipped with three types of arresters, one of each make on each phase, and other circuits are equipped with a spacing about twice as close as the average spacing which has been standard throughout the system. It is going to require several years to accumulate data as to the effect of that sort of experiment, and that data should be sought by other companies having two-phase, four-wire, and three-phase, three wire systems.

It was moved that the recommendation as to the committee work be presented to the executive committee with the indorsement of the Power Transmission Section. The meeting then adjourned.

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Left-Hand Group—New York Train at Shasta Springs, Cal.

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Left-Hand Group Golden Poppy Special at Shasta Springs, Cal.

Accounting Sessions.

The first Accounting Session of the convention was called to order at 2:30 o'clock in the afternoon of Tuesday, June 11, by President John F. Gilchrist. The chairman introduced E. J. Bowers, of Kansas City, Mo., who as chairman of the Committee on Uniform Accounting, read the report of that committee.

Right-Hand Group—New York Special.

At a recent meeting of the Accounting Committee in Chicago, it was proposed to recommend to the Executive Committee that the membership be increased to fifteen. It seems advisable that subcommittees be appointed on Public Service Commission Relations, on Standard Classification of Accounts, on Statistics and Costs, and on Forms.

Legislative bodies throughout the United States are constantly interesting themselves in forming commissions to control public utilities. It is vital that companies within the jurisdiction of such commissions keep their accounts uniformly. A sub-committee on public relations should be appointed, to consist of those members of the Accounting Committee who have been foremost in shaping utility accounting methods, and whose prestige would be of weight in inducing commissions to adopt a standard advanced by the Association.

It is pleasing to note in this connection that the Public Service Commission of Maryland has recently accepted the Standard Classification recommended by the Association. This was brought about largely through the efforts of John L. Bailey, of the Consolidated Gas, Electric Light & Power Company, of Baltimore, who is a member of the Committee.

Referring to the comparison of fixed capital, construction and equipment accounts as prescribed by the principal public service commissions and associations, which comparison was tabulated in committee report, Mr. Bowers explained that the first and second were very similar. But the system of accounts prescribed by the Railroad Commission of Wisconsin was quite different.

Right-Hand Group—Golden Poppy Special.

R. H. Ballard, of Los Angeles, said that the Public Service Commission recently appointed for California leaned strongly toward the accounting system of the Second District of New York. It was hoped, however, to get it to adopt the Association's system.

H. E. Addenbrooke stated that not long ago he got the impression that some of the small central stations consider the classification of accounts recommended by the Association too elaborate for their convenience. This might or might not be so, according to the needs of the individual company.

W. H. Gardiner, of New York, asked whether the difficulty found in dividing between transmission and distribution accounts applied to the capital accounts. Mr. Bowers answered that it applied to the fixed capital only, but that the operation account could be included if it was so desired. He stated further that the Committee as a whole did not take exceptions to the Wisconsin Commission Classification. There were a few points which it did not consider practicable; but on the whole the classification coincided very closely with the Interstate Commerce Commission and the National Electric Light Association.

L. B. Faulkner, of Washington, thought it would be a good plan to select from the standard classification of accounts such items as are applicable especially to the smaller companies and group these for the benefit of such companies.

Incandescent Lamp Accounting of the New York Edison Company.

The paper on this subject was presented by W. H. Bogart, of New York, a representative of the company, whose system is described.

The company has a main incandescent-lamp storeroom, where all lamps are received from the manufacturers and from which all deliveries are made, with electric wagons. These deliveries are either direct to customers or to district storerooms, where customers may call for lamps. In the main storeroom there is equipment for handling standard packages of lamps. Also, a part of the room is partitioned off into another room having bins and drawers suitable for carrying a retail stock of lamps.

Old lamps returned from a customer's premises are delivered to the company's testing rooms and racked in trays. When they are sorted they are not poured out on a table, but are handled from the trays one by one. Lamps which still burn are put into separate trays and sent to the photometer room. Carbon-filament lamps are no longer reissued to customers, these having been replaced by 50 and 80-watt Gem lamps. Those 8-candlepower carbon lamps which measure 7-candlepower and all Gem lamps measuring 18, 30, 48, and 73-candlepower, and over, are cleaned and reissued as new lamps. Carbon lamps measuring 6-candlepower and over, and Gem lamps showing less than 18-candlepower, are colored and reissued to customers. Gem lamps measuring less than 16-candlepower are used throughout the company's offices and plants.

The paper was discussed by J. W. Lieb, Jr., of the New York Edison Company; Douglass Burnett, of Baltimore; Herman Spoehrer; H. B. Gear, of Chicago; C. Rummel, of Vancouver, B. C.; J. T. Butler, of San Francisco; Robert S. Hale, of Boston; Will Brown, of Salt Lake City; Vincent G. Skinkle, of Spokane; Mr. Willoughby, of Denver; F. M. White, of Spokane, and E. J. Bowers, of Kansas City. Messrs. Spoehrer, Burnett, Gear, Hale, Brown, Willoughby, Skinkle and White spoke of the methods of handling lamps in their respective cities, comparing these with the system employed by the New York company.

Accounting for Scrap Materials.

Charles E. Bowden's paper on the above subject followed the discussion of Mr. Bogart's paper.

Special Car of the Doherty Organization Enroute to Seattle.

Before putting copper wire scrap in the bin the insulation is always burnt off, it being found that two men can burn the insulation from five tons of copper a day. Lead cable is burned on a platform arranged with a pocket into which the molten lead drains. The molten lead is cast into pigs, and the clean copper put into the proper bin.

Burnt-out lamps are sorted into two groups: those which are still clear and those of which the bulbs are blackened. The clear lamps are shipped to a factory which refills them, and the stubs of the others are saved for the platinum in them. Lamp stubs are sold in 1,000-pound lots at 10 cents a pound, while the clear burnt-out lamps bring $5.00 per barrel of 500 lamps, these being the prices received at the warehouse of the central station. Scrap copper has netted about 12.5 cents per pound for several months.

The company uses most of the pig lead obtained from cable scraps in making solder. Iron is allowed to accumulate until the bins, which hold about five tons each, are full. It is then marketed among local dealers in such material, being sold to the highest bidder.

Mr. Hughes, of Denver, said his company followed practically the same plan as that described in the paper, and E. C. Scobell remarked that he believed it was the custom to charge out scrap values and credit the salvage. Answering a question from C. D. Smith, of Portland, he said that he thought that when old material is taken out and new put in, it is the practice of many companies to credit the job with the salvage value of the material replaced.

The second accounting session, held Wednesday morning, June 12, was called to order by W. W. Freeman, chairman, and the first paper on the program was by Franklin Heydecke, of Newark, N. J., the subject being "Scientific Management of an Accounting Department."

Discussing Mr. Heydecke's paper, J. D. Butler, of San Francisco, spoke interestingly of the organization and management of a large accounting department. Herman Spoehrer's remarks on the subject precipitated a lively discussion of the value of college training to the accountant. Others joining in the discussion were John Priestman, of Vancouver, B. C., and Messrs. Butler, Bowers, Rogers, Young, Scobell and Hughes.

A paper on "Accounting for the Sale of Electric Devices" was presented by L. M. Wallace, of Boston.

Mr. Wallace's paper was discussed by Mr. Rogers. Following Mr. Rogers' discussion of Mr. Wallace's paper, E. C. Scobell read his paper on "Central-Station Motor-Vehicle Costs and their Distribution to Accounts Benefited."

This paper was discussed by Messrs. Bowers, Hughes, Van Warren, C. N. Stannard, Stetson, Spoehrer and Burnett, and S. B. Howard.

A paper on "Regulated Electric Light Accounting," in the absence of the author, H. M. Edwards, was read by J. W. Lieb, Jr.

Having concluded the reading of the paper Mr. Lieb discussed a number of matters brought out by the author, after which he answered several queries by members of the Association. Mr, Lieb said that his company had recently filed with the Commission a petition which, among other things, seeks to secure to the company, a reasonable degree of freedom in administering and maintaining its reserve fund. This fund was established in good faith and the use of the fund is reported in detail to the Commission. The fund is dedicated to the maintenance of the property at its full operating efficiency. Another question before the Commission now was that as to how the depreciation contingency fund shall be kept. Messrs. Bowers, Butler, William J. Hagenah, Hughes, and F. W. Hill took part in the discussion of the paper, and a discussion prepared by C. N. Duffy, of Detroit, was read by the Secretary. After the reading of this there were further remarks by R. A. Brooks, of Bristol, Tenn.; H. E. Addenbrooke, of Chicago; and P. S. Young, of Newark, N. J.

Manufacturers' Exhibits at Seattle.

The next paper before the session was by William Schmidt of Baltimore, on "Progress Made in the Use of the Tabulating Machine."

The discussion of this paper was participated in by Messrs. Bowers, Burnett, Stannard, Donlan, Rogers, White, L. A. Wallon, Hughes and Addenbrooke.

The final paper was on "General Filing Systems," and R. H. Williams, of Chicago, prepared it.

Every new company should immediately take steps to provide for the care of its records of every kind. All departments should work along uniform lines, so that when a general transfer takes place to storage the files can be handled intelligently. Alphabetical filing seems best suited to the correspondence of some concerns. A folder is assigned to each correspondent or subject, and these are filed alphabetically. Copies of outgoing letters and letters received are filed in order of date in each folder. If a given correspondence is of but little importance, it may be filed in a miscellaneous folder kept in the filing case.

The fundamental idea in correspondence filing is to bring together in one folder all letters to and from each correspondent, or referring to any given subject. To do this, detached sheet copies are taken of the outgoing mail, by carbon process or otherwise. Each copy is placed in the same folder with the letter it answers. Folders are filed vertically in a cabinet drawer so that any folder may be taken out and put back without disturbing the others.

Numerical filing is for most lines of business the most practical and scientific, and is widely used. Tough manila folders of uniform size are numbered from 1 upward and filed consecutively. In each folder all the letters to and from one correspondent, or concerning one subject, are placed in order of date, those of latest date in front. Every letter received and copy of every answer sent are marked with the number of that corespondent's folder, and the clerk who files goes simply by the number. To index this correspondence a card system is used.

The paper was discussed by E. M. Podeyn, of Brooklyn; Louis M. McArthur, of Portland, Ore.; C. G. M. Thomas, of Long Island; Paul Spencer, of Philadelphia; J. H. Donlan, of Brooklyn; W. M. Wood, of Portland, Ore., H. S. Knowlton, of Boston, and Messrs. Spoehrer, Scobell and Addenbrooke. Various interesting points with reference to the use of filing systems in the central-station business were brought out.

Convention Notes.

One of the enjoyable features attending the thirty-fifth Convention of the National Electric Light Association relates to the special trains bringing the delegates to the convention. The elaborate plans of the transportation committee were carried out without a hitch and several of the trans-continental trains arrived at Seattle ahead of schedule. In no case was a train behind time.

The "Red Special" was the first to arrive. The Boston "Blue Special" was a part of this train. This was the "tour de luxe," leaving New York on May 26, and stopping en route at many points of scenic and electrical interest. The party enjoyed a delightful trip and were generously entertained at Los Angeles, Pasadena, San Francisco and other points. At San Francisco an elaborate banquet was given under the auspices of the Electrical Development League, as well as other entertainment. The "Red Special" left Seattle on June 14, the party visiting Yellowstone Park, Glenwood Springs, Colorado Springs, Denver, and other points, the schedule providing for arrival in New York on June 29.

The "Pink Special" was a splendid equipment, passing via Pittsburg and Chicago to the Canadian Rockies. Upon the arrival of the train at East Pittsburgh the Westinghouse band got on board and played a number of selections on the way to Pittsburgh. Flower girls distributed boquets to the ladies and bouttonieres to the gentlemen. The company also distributed as souvenirs handsome booklets illustrating scenes en route "Across the Continent." In the card contest for prizes, Mrs. B. Lisle, Providence, R. I., won the prize at bridge whist, an electric coffee percolator; Mrs. C. A. Graves, Brooklyn, N. Y., won an electric iron, and Mrs. H. M. Hope, an electric fan. Under the direction of J. C. McQuiston, who was in charge of the train, a very interesting and amusing moving-picture exhibition was given. In appreciation of his efforts for their comfort and entertainment Mr. McQuiston was presented with a golden Masonic emblem to wear as a watch charm. Mr. McQuiston, who is a 32nd degree Mason, was also presented with a silver-mounted walking stick. Mr. F. D. McQuinn, special representative of the Pennsylvania Railroad, in charge of the train, was presented with a set of cut glass decanters.

The "Green Special" from Chicago, via the Canadian Rockies, brought an equally delighted party. The "500" card party first prize, an eight-inch electric fan, was won by Mrs. A. D. Bailey, Chicago. Second prize, an electric flatiron, was won by Mrs. Homer Niesz, Chicago. The third prize, a toaster stove, was won by Mrs. R. E. Lee, Clarinda, Ia. There were pools on the arriving time at Portal, Banff and Vancouver, and Field, the prizes being won respectively by H. L. Gannett, J. F. Kerlin and A. J. Freeman. A fine vocal entertainment was contributed by Messrs. Lind, White, Eastman, McGovern and Wright, of the Commonwealth Edison Company, Chicago. Miss M. Gille also entertained the party with a number of delightful solos.

The "Purple Special" came from St. Louis, the party being entertained with moving-picture exhibits furnished by the Westinghouse Electric and Manufacturing Company, a Victrola concert, impromptu poetry and dancing.

The "Orange Special" from Chicago carried a lively and happy delegation. Under the direction of J. W. Busch and G. P. Edmonds of Chicago, and J. B. Crane, of Duluth, there were several contests that did much to enliven the journey. Three prizes for ladies were offered by the Westinghouse Electric and Manufacturing Company, and these were awarded as follows: First prize, electric fan, Mrs. W. H. Hodge, Chicago; second prize, toaster stove, Mrs. P. Otto, St. Paul; third prize, electric flatiron, Mrs. P. Junkersfield, Chicago. A vacuum cleaner offered by the Eureka Vacuum Cleaner Company, Detroit, was won by W. A. Staffelbach, Chicago. The pool on the exact arriving time of the train was divided as follows: first prize, $30, W. C. Andrews, New York; second prize, $15, Mrs. F. A. Otto, St. Paul; third prize, $10, J. P. Ohmer, Elkhart, Ind.; fourth prize, $5, T. J. Jackson, Mobile, Ala.

The "Golden Poppy Special," from San Francisco and Los Angeles, carried one of the largest delegations to the convention. The trip was enlivened by singing, card contests, a mock marriage ceremony, and special floral decorations.

The manufacturers were splendid in their generosity and lavish provision for the travelers on the special trains. The Wagner Electric Manufacturing Company presented each passenger with train directories and scenic guides, aluminum drinking cups, and kept the ladies continuously supplied with candies and the gentlemen with cigars and cigarettes. The General Electric Company provided ozonators, which kept the air in perfect condition, presented the ladies with fresh flowers, and the gentlemen with packs of handsome playing cards, and all with sets of picture post cards of the scenes en route. The Westinghouse Electric and Manufacturing Company presented the ladies with corsage bouquets and fresh flowers, and distributed handsome souvenir albums of picturesque places along the way. A handsomely bound and illuminated trip diary, with an introduction by Elbert Hubbard, was distributed on all trains by the National Quality Lamp Division of the General Electric Company. The electrical journals provided copies of their convention and souvenir issues. The Valentine-Clark Company provided handy leather bill-folders.

The Wagner Electric Manufacturing Company arranged for photographs of the "Red Special" and the "Golden Poppy Special" and these are reproduced herewith by special permission. The Wagner Company will provide the passengers of these trains with copies of these photographs as a souvenir of the trip

The Doherty organization, thirty-five strong, came in special cars from Denver, where the Doherty convention had been in session for four days.

Electrical Meterman's Handbook.

The Electrical Meterman's Handbook, published by the Meter Committee, of which O. J. Bushnell, Chicago, is chairman, is probably the most comprehensive treatise on this subject that has even been printed. The handbook covers the subject of meters in 19 chapters, making a total of 1,059 pages. There are about 750 illustrations, and at the end of each chapter there are a number of blank

pages which will facilitate the insertion of notes or addenda. The secretary's office is also to be congratulated upon the excellent work it performed in putting this book through the hands of the printers and bringing it out in such handsome shape in a remarkably short time.

The Rejuvenation of the Sons of Jove.

The Seattle and Tacoma Jovians held a most interesting rejuvenation at the Seattle Armory on Thursday evening when a class of 88 was initiated into the order. Following the ceremonies of the ritual addresses were made by J. F. Gilchrist, retiring president; J. Robert Crouse, and president-elect F. M. Tait, who became a Jovian at this rejuvenation. These exercises were supplemented by an excellent program of vaudeville, which was highly enjoyed by the class of initiates and a large attending delegation of Jovians from all over the country. The rejuvenation was held under the direction of Arthur W. Woodville, statesman for western Washington, and Howard Joslyn of Seattle is also entitled to a great deal of credit for the success of this rejuvenation.

The Convention Daily.

The *Convention Daily* greeted the visitors to the convention the morning of Tuesday, June 11, and continued in service throughout the week, the last issue being published on Friday. This excellent publication kept the attendants fully informed with respect to the convention proceedings and the news of the convention. Much credit is due to W. E. Keily and his staff for this work, which added so much to the enjoyment of the convention occasion. The McGraw Publishing Company, through whose courtesy the *Convention Daily* was published, was the recipient of a special vote of thanks the resolutions committee.

Meeting of Class D Members.

The annual meeting of the Class D members was held on Thursday afternoon with J. C. McQuiston in the chair. Mr. McQuiston outlined the work of the Exhibition Committee, announcing that the exhibition at Seattle comprised over 8,000 square feet. He suggested broadening the scope of the Class D membership, and recommended the advisability of effecting a permanent organization that would take up such subjects as standardization, freight classifications, labor, etc. This recommendation was referred to the Executive Committee, and it was agreed to hold a meeting some time this fall, at which some of these questions would be discussed and action taken thereupon.

The nominating committee recommended the election of J. W. Perry and F. N. Jewett to serve for one year on the Executive Committee, and F. H. Gale, S. E. Doane and J. F. Gilchrist to serve for three years. These nominations were approved by the meeting.

Exhibit of Class D Members.

The exhibit of the Class D members was a particularly attractive and interesting one. The major portion of the armory was separated from the main meeting room by heavy double wooden partitions, with a three-foot air space between the partition walls. The entire dome was shrouded in a canopy of cream and garnet, the side wall and gallery railings being draped with cream and red bunting. The color scheme of the booths was a dazzling white, the tables being covered with cream and buff brown burlap. The general lighting was provided by twenty-one special fixtures, each chandelier carrying approximately 100 tungsten lamps, ranging from 25 to 60 watts. The booth fixtures were of Colonial design, the name of the exhibitor being lettered in gold, the sign being illuminated by trough reflectors which concealed the lamps. The following manufacturers were represented:

American District Steam Company, North Tonawanda, N. Y. Steam heating systems and display of fittings. Represented by E. L. Barnes.

Benjamin Electric Manufacturing Company, Chicago, Benjamin clusters, adapters, industrial lighting units and fixtures. Represented by W. D. Steele, F. H. Poss, M. F. Steel.

Century Electric Company, St. Louis, Mo. Century single-phase motors up to 10 horsepower, one motor being equipped for connection to "Linotype" typsetting machine; Invincible split-phase motors; Century disk and oscillating fans, all in operation. Represented by R. J. Russell, H. H. Thedinga, S. B. Smith, A. J. Davis.

Copeman Electric Stove Company, Flint, Mich. Automatic electric fireless cooker and cookstove. Represented by L. G. Copeman, K. W. Dawson.

Dalton Adding Machine Company, Poplar Bluff, Mo. Adding machines. Represented by V. O. Boone, J. G. Meeks, E. W. Harris.

Dearborn Drug and Chemical Works, Chicago. Samples of lubricating oils and greases, and literature on treatment of boiler feed water. Represented by E. C. Brown, J. W. Harkins, J. B. Lincoln.

Electric Storage Battery Company, Philadelphia, Pa. Samples of "Iron-Clad" Exide, "Hycap" Exide, and Thin-Plate" Exide batteries; E-T Chloride Accumulator for oil switch and excitation work; 29-plate Exide-Hycap cells, similar to equipment used on storage battery cars on Third Avenue, New York; electric vehicle batteries; charging panels, and framed display of battery parts; an example, full size, of the 133-H Exide emergency battery, 84,000 amperes capacity, for Baltimore, Md. Represented by G. H. Atkin, J. Gay, G. R. Murphy, W. G. Bardens, H. S. March, J. W. Conley.

Eureka Vacuum Cleaner Company, Detroit, Mich. Vacuum Cleaners. Represented by F. Wardell, A. L. Generaux.

Federal Sign System (Electric), Chicago. Federal electric signs; vacuum cleaners, electrically operated kitchen utilities, alphabet signs, clamp sockets, lock clamp bushings, Dielite insulating joints. Represented by J. M. Gilchrist, J. H. Goehst.

Fort Wayne Electric Works, Fort Wayne, Ind. Small motors, meters and transformers, massage vibrators and hair driers; fan motors, "Compensarc," for regulating the moving-picture machine arc lamp; "transpotarc," for regulating the arc spot-light; farm-lighting fly-wheel generator for connection with gasolene engine. The star attraction at this exhibit was the Audiffren-Singren ice machine. This is a compact, sturdy outfit, the SO_2 being compressed to a fluid in a hermetically sealed case and the fluid expanded in a revolving refrigerator bell. Atmospheric condensation was used to demonstrate the high efficiency of this equipment, snow crystals forming instantly upon the beginning of the cycle of compressions and expansions. Represented by F. S. Hunting, G. I. Kinney, W. K. Hendrey, H. L. Eicher.

Franklin Electric Manufacturing Company, Hartford, Conn. Incandescent lamps. Represented by P. W. Huston, A. H. Jaeger, R. D. Holabird.

General Electric Company, Schenectady, N. Y. G. E. Mazda lamps, Gem, tantalum and carbon incandescent lamps; arc lamps; electric heating and cooking appliances; electric range; mercury arc rectifier; color-matching equipment; gasolene-electric generating set; electric drills and hammers; starting compensators; ozonators; watt-meters; stationary and portable measuring instruments; maximum demand indicators; type IRS potential regulator, fully equipped; alternating and direct-current motors; desk and bracket oscillating fans. Represented by T. Addison, I. Bevan, T. E. Bibbins, J. A. Cranston, F. H. Gale, C. B. Burleigh, H. L. Monroe, R. E. Moore, A. D. Page, C. W. Stone, G. C. Osborn, G. D. Rosenthal, F. G. Vaughn, N. R. Birge, M. O. Troy.

G. & W. Electric Specialty Company, Chicago. Cable terminals for inside and outside work, from 3,000 to 30,000 volts. Represented by G. P. Edmonds.

Hubbard & Company, Pittsburgh, Pa. Line material and supplies. Represented by F. C. Todt, R. N. Dickinson, A. E. Boyles.

Hughes Electric Heating Company, Chicago. A comprehensive display of two and four cover electric stoves, ovens, toasters, hot-plates, and a fully equipped kitchen and restaurant type range. Represented by G. A. Hughes, C. A. Weaver, B. R. Stave.

Hurley Machine Company, Chicago. Hurley washing machines, featuring copper mechanism and metal cylinder, with permanent water connection and drain for apartment house use. The two-roll, reversing wringer, shown for the first time on the Coast. Cast-iron-enameled and porcelain machines. Represented by N. C. Hurley, M. N. Hurley, Jr.

H. W. Johns-Manville Company, New York. High-tension and low-tension protective devices; fuses and fuse boxes; terminal boxes; reflectors, Linolite and Frink lighting systems; a complete, working demonstration of the Audiffren-Singren automatic refrigerating machine. Represented by J. W. Perry, J. C. Morris, F. S. Mills, S. P. Russell, R. C. Cole, W. E. Wright, G. G. Gunderson, F. W. Doty, B. Hatton, G. A. Saylor, V. A. Wellman, H. G. Peterson, D. A. Boylan, I. T. De Silver, F. W. Loomis.

Metropolitan Engineering Company, Brooklyn, N. Y. Circuit protective devices and equipment. Represented by T. E. Murray, P. E. Brown.

Minerallac Electric Company, Chicago, Ill. Minerallac insulating compound, fault-finder. A working demonstration of the "maxicator" and "maxometer" attracted a great deal of attention and favorable comment. Represented by H. S. Sines, C. N. Arnold.

Otis Elevator Company, New York. Literature on elevators, and photographs of buildings where Otis elevators are installed. Represented by R. W. Charles, R. J. Huntington, P. C. Bebb, R. A. Parks.

Pacific Electric Heating Company, Ontario, Cal. Electric heating appliances. Represented by F. Booth, H.

T. Van Riper, J. N. Bowden, H. T. McCrea.

Philadelphia Electrical Manufacturing Company, Philadelphia, Pa. Tungsten arc lamps; street lighting fixtures; series sockets; absolute cutouts. Represented by C. L. Bundy.

Simplex Electric Heating Company, Cambridge, Mass. Full line of electric cooking appliances. Represented by J. I. Ayer, G. Young, F. G. Larkin, F. H. Smith.

Wagner Electric Manufacturing Company, St. Louis, Mo. Single-phase motors, meters, transformers, Wagner rectifier, working demonstrations. Represented by F. N. Jewett, J. Mustard, A. T. Myers, T. S. Clark, F. R. Bates, R. D. Lillibridge.

Waverley Company, Indianapolis, Ind., Electric Carriage. Represented by F. T. Bird.

Western Electric Company, Chicago. Interphones, fans, American heating equipment, Sturtevant vacuum cleaner, Sunbeam Mazda lamps, D & W fuses. Represented by F. B. Gleason, P. J. Aaron, Carl Bush, L. Brown, M. H. Nichols, F. Parrish, A. L. Phillips.

Weston Electrical Instrument Company, Waverly Park, N. J. Full line of standard switchboard instuments and portable measuring instruments, both alternating current and direct current. Motor-generator set and flasher in operation in circuit with meters showing dead-beat qualities of instruments. New line of miniature direct-current instruments for switchboard and portable use. Represented by F. E. Smith, A. Honeychurch.

Westinghouse Companies, Pittsburgh, Pa. Three distinct exhibits representing a complete line of arc and incandescent lighting units, electric fans, household and industrial heating and cooking apparatus, alternating-current and direct-current motors, measuring instruments, switchboards, oil switches, and heavy electrical equipment. Represented by G. E. Tripp, L. A. Osborne, S. L. Nicholson, W. W. Briggs, C. S. Cook, G. B. Griffin, J. C. McQuiston, A. A. Brown, W. S. Rugg, J. J. Gibson, W. E. Brett, T. P. Gaylord, C. E. Heise, K. E. Van Kuran, A. Tobias, J. W. Busch.

G. M. Gest, conduit engineer and contractor, of New York and Cincinnati, was represented by W. T. Jackson.

The National Carbon Company, Cleveland, Ohio, was represented by N. C. Cotabish, J. F. Kerlin, C. W. Wilkins and A. E. Carrier.

The Valentine-Clark Company, Minneapolis, Minn., was represented by E. L. Clark and L. G. Clark.

The Lindsley Brothers Company, Spokane, Wash., was represented by E. A. Lindsley.

The Standard Underground Cable Company, Pittsburgh, Pa., was represented by C. A. Brown, A. S. Saurman.

The Diamond Rubber Company, Akron, Ohio, was represented by A. H. Cogswell, H. S. Mason.

The Morris Iron Works, Frederick, Md., was represented by Eugene Creed.

The Bryan-Marsh Works, Chicago, was represented by E. H. Haughton, L. D. Cushing.

The Electrical Testing Laboratories, New York, was represented by F. M. Farmer.

Pass & Seymour, Inc., Solvay, N. Y., was represented by W. Brewster Hall.

R. Thomas & Sons Company, East Liverpool, Ohio, was represented by R. W. Harms.

Dossert & Company, New York, was represented by H. B. Logan.

The Okonite Company, New York, was represented by George T. Manson, L. C. Love.

The John A. Roebling's Sons Company, Trenton, N. J., was represented by A. R. Mosley, J. E. Mosley, W. R. Sheldon.

The Allis-Chalmers Company, Milwaukee, Wis., was represented by T. Neese, E. A. Quinn.

The H. T. Paiste Company, Philadelphia, Pa., was represented by H. T. Paiste.

The Safety Insulated Wire & Cable Company, New York, was represented by Ralph Phelps, Herbert Smith.

The Peerless Lamp Works, Warren, Ohio, was represented by C. O. Brandel, J. V. H. Wahl.

Electric Traction with Rectified Current.

An electric locomotive has been constructed in Switzerland, which is supplied with single-phase current from an overhead line at 12,000 volts and 25 cycles. The current is rectified in the locomotive by means of a special mechanical rectifier designed by Auvert and Ferrand.

A magnetic ring forms a core for the winding, which is split into two parallel circuits. It is provided with a commutator, whose segments are connected to the various sections of the winding. This is rotated and direct current is carried off by means of brushes bearing on the commutator. The rectifier is driven by a synchronous motor mounted on the same shaft and operated from the secondary circuit of the transformer. The current is stepped down by a transformer before being rectified, and the rectified current is delivered at 600 volts. It is undulating in character, but the use of a choke coil keeps the variations within narrow limits.

The locomotive carries two motors of 400 horsepower each, connected in series. The efficiency of the entire electrical apparatus in the locomotive is about 80 per cent. The chief advantages claimed for this system of drive are flexibility of control and high efficiency.

New Mexico's Coal Production.

New Mexico's coal production in 1911 was 3,148,158 short tons, with a spot value of $4,525,925, according to a statement by E. W. Parker just made public by the United States Geological Survey. In common with most of the states in the Rocky Mountain region New Mexico produced less coal in 1911 than in 1910, a decrease of 360,163 short tons, or 10.3 per cent. Colfax County, in addition to producing 75 per cent of the total output of New Mexico, is also the only county in which coking operations are carried on, and in 1911 a total of 767,108 tons of coal mined was made into coke.

A Defense of the Present Patent Situation.

Max W. Zabel, a patent attorney of Chicago, defended various features of our present patent laws in an address before the Electric Club of Chicago on June 13. The speaker based his remarks, principally on the arguments advanced by C. F. Adams, of New York, in an address before the Electric Club recently on the subject of "Patent Rights and Public Policies."

Speaking of the policy of the Government in granting monopolies to inventors Mr. Zabel said that this reward has had a great influence in stimulating commercial activities of this country. He thought that it would be impossible to reward an inventor in a measure portional to the value of the patent—as was advocated by Mr. Adams, as no one could know what the future value of a patent would be. He agreed with Mr. Adams that natural laws belong to mankind and should not be made the subject of patent rights.

Referring o some of the defects of present patent laws Mr. Zabel said that the heavy expense involved in patent legislation is a feature that should be remedied. He spoke of the Dick decision and thought that while it was a just one in this particular case there was grave danger of it being wrongly interpreted by the lower courts. Articles not specifically covered by patents should not be monopolized by inventors.

The uncertainty of knowing the validity of a patent is another defect of the present laws, according to Mr. Zabel, who advocated the trial of all patent cases in the open courts. The cost in such case would rarely exceed $500, as compared with $3,000 to $5,000 under prevailing conditions. The speaker also thought that patents were at present held in the patent office for too long a period.

In conclusion Mr. Zabel said that he is opposed to the sweeping attacks that have recently been made on the patent system in this country and thought that with several revisions the objectionable features now critisized would be eliminated.

George W. Cravens asked if the publication of an inventor's claims would not tend to reduce infringement. Mr. Zabel and E. A. Rummler replied to this query in the negative, both stating that this complicated matters.

M. G. Lloyd discussed the question briefly and advocated a court composed of technically trained men to hear all patent cases. Regarding the Dick decision he said that the important point brought out was that the enforcement of a contract is taken out of the jurisdiction of the state courts and placed under Federal patent laws.

Electrical Construction

Electrical Construction in Theaters.

There are rather few enterprises in which electrical apparatus finds more important and frequent applications than in the modern theater. Moreover, the electrical installation in any properly equipped theater possesses many features that are distinctive and unique, and the demands on the service are peculiarly exacting. The apparatus must be properly selected and correctly installed, and every precaution must be observed to insure safety and entire freedom from interruptions of the service. These facts are sufficient, it is thought, to make an account of portions of the equipment for service of this kind of interest.

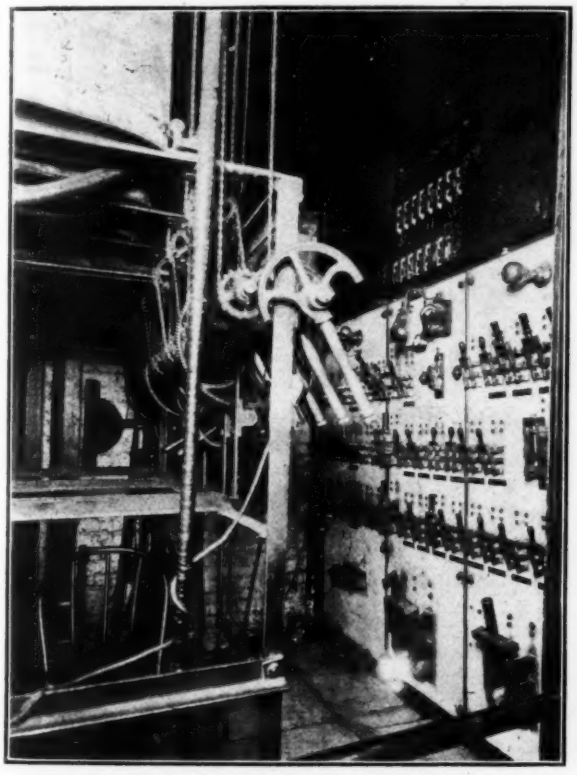


Fig. 1.—Front View of Control Board.

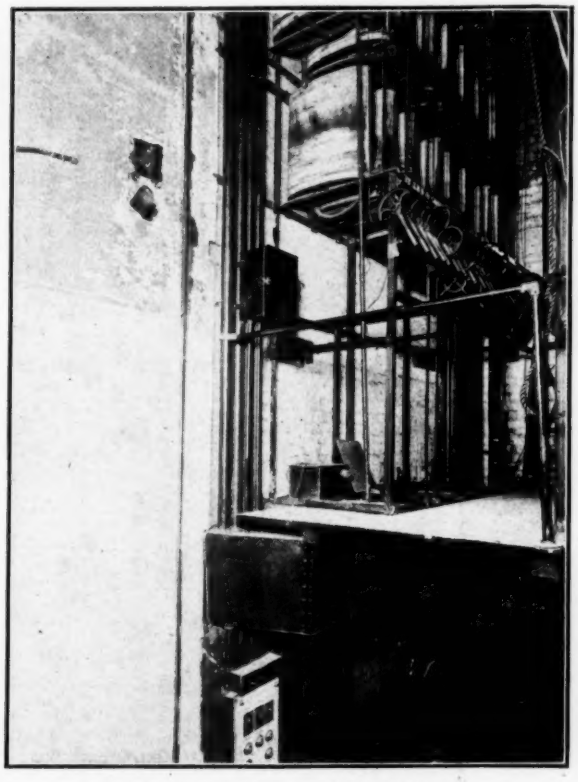


Fig. 2.—Another View of Control System.

It will be recalled that the National Electrical Code requires that theater buildings wired for electricity must be provided with two services or their equivalent. When two distinct services are impossible, lights at exits, in lobbies, on stairways and in similar places must be supplied from a point on the street side of the main fuses. The aim of this provision is, doubtless, to avoid the possibility of the building being left in darkness by the blowing of a service fuse and to make doubly sure that the exits will always be lighted in case any accident should cause a stampede of the audience from the building.

In the Auditorium Theater in Chicago two services are supplied to the switchboard shown in Fig. 5. This figure is a view of the rear of the board. From this board four circuits are run to supply the lighting on the stage, and in the auditorium, lobbies, boxes and other parts of the theater. The circuits are run in conduit, of course. The conduits may be seen in the upper part of the photograph. The Auditorium building formerly had its own electric power plant, and this switchboard was a part of the equipment of this plant. When the dynamos and engines were taken out the board was left as a sort of service board for the building. As the figure shows, the rear of the switchboard is completely inclosed in a large sheet-metal cabinet, and thus the danger of accidental short-circuits between bare busbars of opposite polarity is eliminated.

Power for that part of the theater in which it is necessary for the electric current to be under convenient control of the theater electrician during a performance is carried from the board just mentioned to a large distributing and control board located on an elevated platform at one side of the stage, which is shown in Fig. 1. An idea of the large number of circuits run from the latter board may be obtained from the number of switches seen in the photograph. These circuits feed stage pockets, footlights and other stage lights, and various lighting circuits in the building. In the fuse cabinet at the top of the board the circuits are all fused with cartridge fuses according to their respective carrying capacities, and the branch circuits which

they supply with current are fused for the wattage which the Code allows as the maximum load on such branches, these fuses being located in cutout boxes installed at convenient points. Feeders for border lights and footlights are fused for 1,320 watts.

Near the lower left-hand corner of Fig. 2 there may be seen one of the small metal cabinets containing receptacles into which stage cable may be plugged for supplying current to spot lights and for other similar service. The stage in this theater, being one of the largest in the country, is supplied with a large number of pockets underneath the stage floor

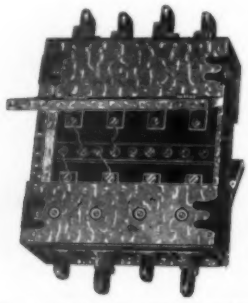


Fig. 3.—Portable Stage Pocket.

containing receptacles similar to those just mentioned. By lifting a metal door set in the floor the receptacles are made accessible. The receptacles are set back from under the door so that objects falling into a pocket while it is open are not liable to lodge in a receptacle and establish a short-circuit there. Each pocket contains receptacles for both arc and incandescent lamps. A small cutout cabinet is installed under the floor near the pocket, and in this the receptacles are properly fused.

There are receptacles in the vertical wall of the stage front, these being for orchestra lights. Moreover, each music stand has a fused receptacle installed on it, so that one stand may be plugged into the stage and another one plugged into it.

Fig. 5.—Switchboard in Auditorium Theater.

The method employed in furnishing light to janitors engaged in sweeping out the theater after a performance is worth noting. Groups of incandescent lamps mounted on portable stands are supplied, and these are lighted from the nearest receptacle by means of flexible cables. This affords a better light for the purpose than would usually be available by turning on the lights installed for the ordinary illumination of the room, and it saves current.

Even when a theater is wired with so many receptacles for attachment plugs portable stage pockets are often necessary. Fig. 3 shows one of these used in the installation under consideration. A live cable is plugged into a receptacle not seen in the figure, and appliances such as the spot lamp shown in Fig. 6 may be plugged into the receptacles from which the lugs are seen projecting on the sides of the box. Thus a number of pieces of apparatus may be supplied with current from one fixed pocket, and each appliance will be properly fused in the portable box. The apparatus shown in Figs. 3 and 6 was made by the Chicago Stage Lighting Company. The small

Fig. 6.—Spot Lamp.

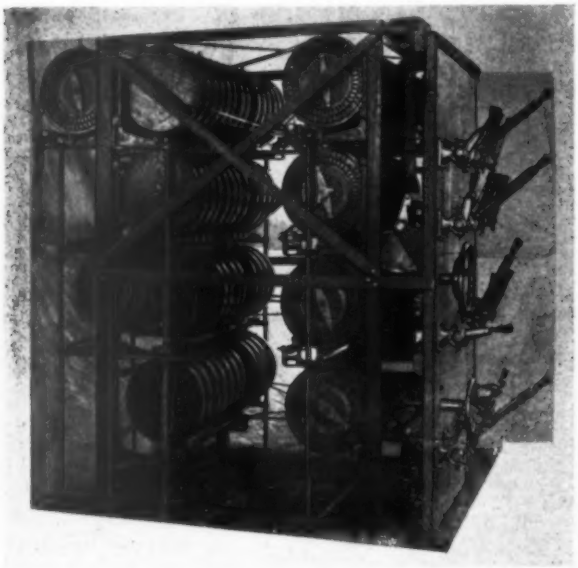


Fig. 4.—Dimmer Installation in Cleveland Hippodrome.

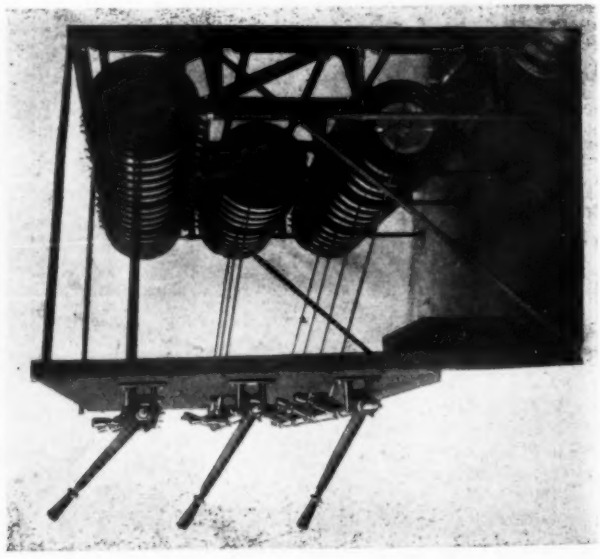


Fig. 7.—Harlem Auditorium Dimmer Bank.

cabinet on the vertical support of the spot lamp contains the switch required by the Code for lamps of this sort. It will be noted that the blades of the switch are inclosed, as the Code requires.

Theater dimmers are not so well known as are many other electrical appliances. Fig. 1 shows the bank of dimmers used in the Auditorium Theater. They consist of a number of large rheostats mounted in the circuits of the lights to be dimmed. They are controlled by means of the short levers seen in the photograph. By means of these the resistance of a single dimmer circuit may be varied at will, or, when it is desired, the dimmers may be operated in groups.

Figs. 7 and 8 show a type of dimmer manufactured by the Cutler-Hammer Manufacturing Company. Dimmers of this kind are made up of separate units into banks which may be adjusted to fit into almost any space.

It will be noted that each individual resistance plate has its own control lever. For large banks of dimmers it is necessary to provide master levers so that several units can be operated by one movement.

Referring to the Auditorium Theater again, it is interesting to note the electrical equipment for the operation of the large pipe organ there. An 11-horsepower Westinghouse motor drives the bellows by means of belt connections. When the air pressure reaches the desired value the belts are shifted automatically to idle pulleys, where they remain until the pressure drops, when they are automatically thrown into the running position again. A motor-generator set converts the voltage of one of the circuits from 110 to 10 volts, and this low-voltage current is employed to excite the magnets used in the operation of the pipes while the organ is being played. There is also a 10-volt storage battery which is used as an auxiliary.

In Fig. 3 a part of switchboard in one of the signaling systems in the theater may be seen. The board for the dressing-room signals has on it an indicator which shows whether the signal is operating in a given room when the button is being pushed.

The electrical equipment of the Auditorium Theater is in charge of Joseph Baker, the theater electrician.

PROPOSAL

RALSTON ELECTRIC SUPPLY CO.

310 WEST SECOND STREET

ALBANY, ORE. 191

We propose to furnish all labor and material necessary to install the electric work in your building as shown on plans and specifications and in accordance with the Rules of the National Board of Fire Underwriters. All work to be done according to the following schedule. Additional work or changes must be specified by owner or superintendent in charge.

LOCATION	Outlets	Ceilings	Elec	Flush S P	Flush TW	Snap S P	Snap 3 W	MATERIAL TO BE FURNISHED	Quantity	Cat. No.	Finish
								Switch Boxes			
								S. P. Snap Switches			
								3 Way Snap Switches			
								S. P. Flush Switches			
								3 Way Flush Switches			
								Switch Plates			
								Entrance Switches			
								Plug Cut-Outs			
								Plug Cut-Outs			
								Fuse Plugs			
								Batteries			
								Bells			
								Push Buttons			
TOTAL											

Roughing In ..... Time ..... Material ..... Total .....

Material Finishing ..... Time ..... Material ..... Total .....

All for the sum of ..... Dollars,

$ ..... payable when work is roughed in, balance upon completion.

Accepted this ..... day of ..... 191...

Ralston Electric Supply Co.

By .....

Fig. 1.—Proposal Blank.

Blank Forms for Use in Electrical Contracting.

The two accompanying figures are reproductions of form sheets used by the Ralston Electric Supply Company, of Albany, Ore., in the electrical-contracting business. The forms were designed by J. H. Ralston, and have been found to be very serviceable for the purpose for which they are intended.

Fig. 1 is the blank proposal used in submitting bids on electric wiring. The nature of the form becomes evident from a study of the figure. It possesses a number of excellent features which contractors and their patrons readily appreciate. This proposal form seems to be quite complete, and, at the same time, to be so simple as to allow very little chance for errors. In using it the Ralston company does not itemize the proposal fully in cases where such a procedure is undesirable; but the duplicate form retained in the office always contains every item in detail.

RALSTON ELECTRIC SUPPLY CO.

Name .....

Order No. .....

Workman ..... Time .....

Work to be Done

CONTRACT		T & M		COMPLETED			
MATERIAL				OUT	IN	USED	CHARGED

Fig. 2.—Workman's Time-Charge Slip.

Fig. 2 shows the kind of slip employed by the firm for keeping a record of the workmen on any job, and of the material used on the job. When properly filled out these slips show what the total time of each man was, just what material was taken out of the stock room and what was returned. Thus it becomes a very simple matter to compute the total expense of time and material on the installation.

The firm also supplies its employees with blank forms for keeping records of the work engaged in during each hour of the day. At the top are lines for the date and the name of the workman. Arranged in a vertical column down the left-hand side of the sheet is the designation of each hour in the day between 7 a. m. and 6 p. m. To the right of these numbers are blank spaces in which workmen make notes of what they were doing at any particular hour.

Elementary Notes on Alternating Currents.—II.

It has been explained that the voltage in a circuit supplied with power by an alternating-current dynamo passes through one cycle in the interval required, in the rotation of the field structure, to carry two adjacent poles of the field past any given fixed point in the armature. This interval, it will be recalled, is termed a period. It was explained also that any two neighboring points in the alternator armature separated from each other by a linear distance equal to that between points *1* and *5* (Fig. 8) of the field are usually said to be 360 electrical or pole degrees apart. That is, twice the distance from the center of a north pole, say, to the center of the next south pole of the field is equivalent to 180 pole degrees.

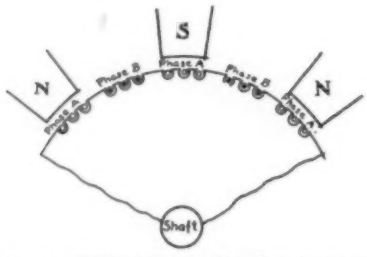


Fig. 6.—Distribution of Winding in Two-Phase Alternator.

In the discussion in the first paper nothing was said concerning number of phases. Throughout the discussion, however, the writer had single-phase machines and single-phase circuits in mind.

Dynamos designed to generate alternating voltages of more than one phase are classed as *polyphase* alternators. In commercial practice these rarely ever include anything but two-phase and three-phase machines, and the use of the three-phase alternator is now much more general than that of the two-phase machine.

A working notion of the essential difference between the construction of a single-phase alternator and a three-phase alternator may readily be obtained from a study of Fig. 8.

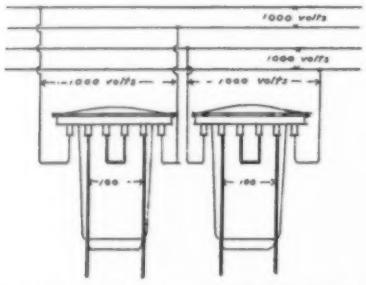


Fig. 7.—Transformers on Two-Phase Circuit.

In a single-phase generator the armature has but one winding, and all the conductors of all the coils are parts of this. In a three-phase alternator there are three separate windings on the armature, and the three phases are obtained by spacing the windings properly with reference to one another and to the field poles. For example, suppose *a*, *b*, and *c*, in Fig. 8, to represent armature wires or groups of wires separated from each other by a distance, measured along the inner surface of the armature, equal to one-sixth the distance between points *1* and *5*, the latter distance being similarly measured. In other words, assume these conductors to be separated by 60 electrical or pole degrees. It is clear that as the field rotates to the right any given point in the field will pass *b* a sixth of a period after *a* was passed and that *c* will be passed by this same moving point when another sixth of a period has elapsed. Assume wires *a*, *b*, and *c* to be parts of separate windings. As was previously explained, when point *1* is passing *a* the voltage induced in *a* will pass through the zero value; a sixth of a period thereafter it will be zero in *b*, and after another equal interval zero in *c*. Other corresponding values of voltages induced in *a*, *b* and *c* will bear the same time relation to each other as these zero values. In short, voltage *b* will be 60 degrees behind *a* in phase, and *c* 60 degrees behind *b*.

It appears, then, that by placing three windings on the armature core of an alternator and spacing the coils of the windings in the manner indicated in Fig. 8, the machine can be used to generate voltages and supply currents of three different phases. In the actual three-phase alternator the connections of the winding of which *b* is a part are reversed, so that in the alternator circuit the voltage or the current in phase *B* reaches its maximum value in a given direction one-third of a period behind the voltage or current in Phase *A*. The curves of Fig. 7 indicate the phase relations of the voltages or the currents in a three-phase circuit. The dotted curve shows how Phase *B* would be related to the other phases if the winding were not reversed.

In the left-hand side of Fig. 8 the end connections of coils are indicated, the conductors of each phase being differently shaded. Such a section as Fig. 8 would not generally include a representation of these end connections, but it is thought that adding them here makes the discussion clearer. For the sake of clearness, too, the direction of the magnetic field is indicated for only a few of the poles. It is not considered necessary to draw in the armature slots except in those parts of the armature where a portion of the winding is shown.

The three windings of a three-phase alternator might be brought out from the armature to supply current to a three-phase circuit consisting of six conductors, and the phases would differ from each other, of course, by a third of a period or 120 degrees. In practice, however, the armature windings are connected together in one or the other of two ways, one of which is known as the *star* or *Y* connection and the other as the *delta* connection, and usually only three leads are brought out from the machine. In the case of a delta-connected armature four leads may be brought out and the three-phase circuit run four-wire, instead of three-wire as is generally the case.

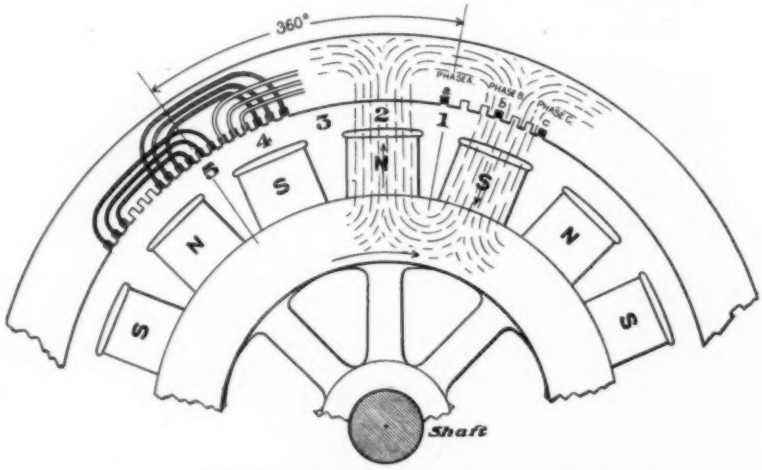


Fig. 8.—Indicating Method of Winding Three-Phase Alternator.

In the armature of a two-phase alternator there are two independent windings, and neighboring coils of these are spaced 90 pole degrees apart. When any point in the winding of one phase is squarely opposite the center of a field pole, the corresponding point of the winding of the other phase is midway between two poles. The relative positions of the windings of a two-phase machine are indicated in Fig. 6. Since the principle is the same, this figure is drawn for a machine of the revolving-armature type. As in the case of the three-phase

generator, the armature of the two-phase alternator is usually of the stationary type, however. Fig. 11 is a photograph of the armature of such a machine, with the field removed.

With most two-phase alternators both ends of both windings of the armature are brought out, and the circuit run from the machine four-wire. Fig. 7 shows

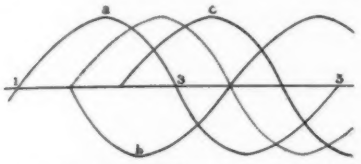


Fig. 9.—Curves of Voltage or Current Relations in a Three-Phase Circuit.

how two transformers may be connected to supply a four-wire secondary circuit from a four-wire two-phase primary line. For convenience, it is assumed that the primary voltage is 1,000 and that the voltage ratio of each transformer is 10 to 1.

Fig. 10 shows how the same transformers may be connected to convert the circuit into a three-wire two-phase system.

If the three phases of a three-wire three-phase circuit are equally loaded and the power-factors are the same in each phase, the voltages between any two of the three wires of the circuit will be equal, as will also the currents in the three conductors of the circuit. But the voltage between the two outside wires in a three-wire two-phase line is about 141 per cent of that between the middle, or so-called neutral wire, and either outside wire. Also, the current in the middle wire when the two-phases are equally loaded at the same power-factor is about 141 per cent of that in either one of the other two wires.

Grades of Mica.

There are white, green, ruby and amber-colored micas. The latter variety is the softest, and it is considered good

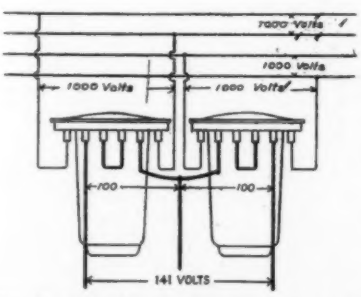


Fig 10.—Changing Four-Wire Circuit to Three-Wire Service.

practice to employ it for commutator insulation; the others vary in degree of hardness, and find extensive use for various purposes.

Chattering and Sparking Brushes.

About 90 per cent of commutator and brush troubles put down to faulty design are due entirely to lack of knowledge on the part of the men in charge of the plant. In order to keep a commutator in good repair, it is necessary that it should have the closest attention. Should the commutator commence sparking, it may be cleaned with a little kerosene, but too much should not be used as it is a very good insulator. Use sufficient to dampen a piece of clean rag and rub lightly across the commutator; if this will not remove the trouble, the brushes may be lifted, one at a time, and the bearing surface cleaned in the same manner as the commutator.

If the trouble is caused by a bad segment, it will be necessary to overhaul the machine. The commutator must receive the first treatment, after making sure that the trouble is not due to a short-circuited armature coil or a broken connection, which can be found by placing a galvanometer across the blackened segment. Now rub down the commutator with carborundum until the flat spot has disappeared, after which smooth off with sandpaper and polish. Next take

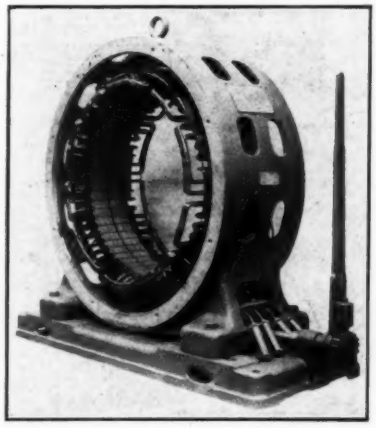


Fig. 11.—Armature of Two-Phase Alternator with Field Removed.

out and thoroughly clean the brushes, and in resetting them place a strip of paper around the commutator; mark off where the ends meet, divide the paper into the same number of divisions as there are poles and again place this around the commutator. Now, if one of the brushes is placed to the mark on the commutator, it will be found to be slightly tipped and this must be fitted to the contour of the commutator. This is done by placing a strip of sandpaper between the brush and the commutator with the plain side against the commutator. It is then drawn backward and forward until the brush "toes the line" and makes a perfect contact with the commutator. After treating one brush on each pole in this manner the paper may be taken out and the other brushes treated similarly. Care must be taken not to place the brushes on the commutator behind each other, but rather stagger them over the commutator so that the whole surface is covered. covered.

When the brushes are finished they should be in perfect alignment axially. Before throwing the load on the machine the commutator must be wiped clean to make sure that no dirt has got under the brushes. Finally, the machine should be run without load with the brushes bearing on the commutator for some time. This will put a smooth surface on the brushes, which will also help to polish the commutator.

Of course, faults may appear which are due to faulty design, such as weak insulation on the armature coils or soft mica between the segments, which burn away and cause the segments to be short-circuited, but, generally speaking, the trouble may be overcome by carrying out the foregoing instructions.—*Power.*

Notes on the Care of Commutators.

On all types of generators and motors it is most essential to keep the commutators free from dirt and oils. While oil in itself is a good insulator, it nevertheless serves as an excellent medium in which conductive particles such as carbon and copper dust can be carried.

The presence of this is naturally undesirable on all insulated portions of an electric machine, and whenever found should be removed at once.

Insulation which is physically perfect may carry current due to surface conductivity set up by the presence of this paste, composed of particles of copper and carbon dust deposited in oil.

On machines of low armature speeds, and those which are reversible, it is sometimes difficult to confine all the oil to the bearing, and a portion of it runs out on the shaft, due to the low centrifugal force imparted to it from the oil slings. From here it may get upon the head of the commutator, and then on to the mica insulating ring at the base of the commutator bars.

While it is not serious on the commutator head, it may become so when it spreads on the mica ring. There is such a small quantity of it that the conductive particles adhere to it readily. This practically annuls the function of the mica ring as an insulator, and grounding of the bars to the head results. The mica ring, at least, should be kept dry and clean.

Sandpapering commutators should be avoided as much as possible. Polishing them when new with canvas brings a fine blue finish and better results. —*The Indicator.*

Among the Contractors.

The White City Electric Company, 227 West Van Burent Street, Chicago, is putting in an electric-lighting installation for the Central Manufacturing District of Chicago.

The Booker Box Company, of Louisville, Ky., has let a contract for the installation of 25 motors to the James Clark Jr. Electric Company, of Louisville.

Henry Newgard & Company, 947 Washington Boulevard, Chicago, is installing 200 motors in the manufacturing plant of Thomson, Taylor & Company, in this city. The motor equipment will aggregate 2,600 horsepower.

The Alloway Electric Construction Company, 30 North La Salle Street, Chicago, is doing the wiring for 700 incandescent lamps in a building erected by P. Young in Chicago.

The Dings Electric Company, of Centralia, Wash., has just completed the entire electrical installation in the new Centralia high-school building. This work consisted of four separate contracts totaling $4,455 and included the wiring, electric clock and call-bell system, the electric fixtures and the cluster-lamp posts on the school grounds. This company has also been awarded the contract for the wiring of the new public library in Centralia, and among jobs recently completed was the wiring of the "Woodmen" building in Winlock, Wash.

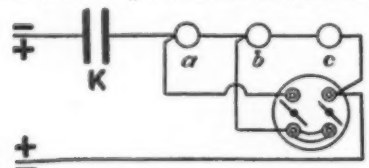


Fig. 1.—Lamp in Series on Condenser Circuit.

Alvin Dings, manager of the company, was for some years supervising electrician with the Allis-Chalmers Company and later was president of the Dings Electro-Magnetic Separator Company of Milwaukee, whose earlier patents were taken out by him and assigned to the company.

The electrical work in the Anne Durand Hospital, Chicago, is being done by the McFell Electric Company, 569 West Van Buren Street, Chicago. There will be about 600 incandescent lamps and a number of small motors.

An electrical installation consisting of about 1,000 incandescent lamps, 41 motors and a switchboard is being put in at the factory of the J. P. Smith Shoe Company, Chicago, by Kohler Brothers, 343 South Dearborn Street, Chicago.

Lighting Circuits Containing Condenser.

Such interest has been recently shown in the application of the condenser in certain types of alternating-current lighting installations that it is thought that the accompanying diagrams, from *Electricity*, showing how the condenser may be used in an incandescent-lamp circuit, will be of interest. In both figures the condenser is marked K.

Fig. 1 is intended to indicate a method of control for three lamps connected in series with a condenser. When the switch is in the position shown, all the lamps are burning. By turning the switch so as to complete the circuit between the two left-hand points, lamp *a* may be cut out of circuit. If the right-hand side of the switch is then closed, all the lamps are extinguished. With the side first mentioned as shown in the figure and the other side of the switch closed, only lamp *a* burns. If the lamps and the condenser are properly chosen, the candle-power of the lighted lamp or lamps will be the same per lamp regardless of the number of lamps burning. No energy is wasted in the condenser.

Fig. 2 suggests a method of control for an entire floor. It will be noted that the lamps are connected in series here also, and that individual lights are extinguished by shunting the current around them through a switch. There are many of the usual arrangements for remote control here, which become clear upon examination of the diagram.

While only lamps in series are shown in the two figures, condensers may be used in multiple circuits. Here each lighting unit is connected in series with a condenser. This scheme makes it possible to operate low-voltage lamps in single units in multiple with lamps of higher voltage without the use of resistance or choke coil.

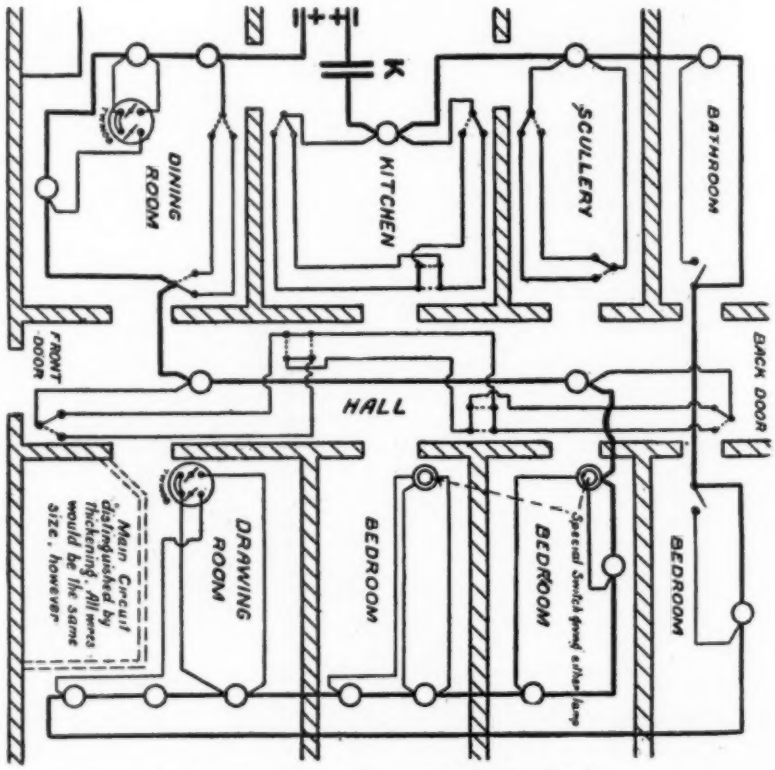


Fig. 2.—Plan of Wiring Floor on Condenser Circuit.

Thawing a Water Pipe.

A writer in *Power* tells of an instance in which a frozen water pipe an inch and a quarter in size and 900 feet long was thawed out in four hours by means of current from a 30-kilowatt transformer.

The transformer was designed for 2,300 volts primary and 122 volts secondary. The primaries were connected to the pole line through plug cutouts, and an ammeter was connected in the circuit. The 122-volt secondary terminals were connected directly to the pipe. The circuit was connected to an idle alternator and the engine speed adjusted by throttling so as to make the transformer deliver about its full-load current. Regulating in this way from the station made it unnecessary to use any resistance in either the primary or the secondary circuit. The meters at the station showed 80 volts and 14 amperes.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Fastening Conduit Boxes.

I think this is a better way to fasten outlet boxes on a concrete form than the way given by Mr. Piccard in the issue of June 8. This method does away with the bad practice of leaving sharp ends of bolts, nails, and screws in the box after they have been cut off. Bore a three-eighths-inch hole in the form where the center of the outlet is wanted, and put a three-eighths-inch coupling and nipple on the outlet box stud; then put the nipple through the hole in the form and put a locknut on

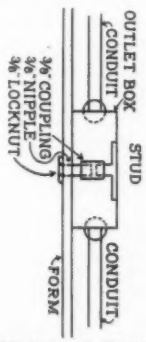


Fig. 1.—Method of Fastening Box.

to pull the box up tight. When the form is taken down these nipples can be sent back to the shop for the next job.

E. W. Dullea.

Concerning Service Entrances.

When a group of buildings are to be wired and all are to be connected to one meter, the cost of making the connections to the various outside walls can be about halved as to cost of labor as well as material used by using screw hooks and the new kind of porcelain strain insulators recently put on the market. These insulators consist of a cylindrical piece of porcelain with two holes at right angles to each other and at opposite ends of the porcelain and having grooves for the wire.

By passing the hook end of the screw hook through one hole of the strain and screwing the hook in the wall, the wire can then be passed through the other hole, and, after being wrapped a couple of times on itself, run to the drip loop. This makes a good substantial connection at about half the usual cost.

A. E. Anderson.

A Convenient Boring Tool.

In my work as an electrician I have sometimes found it very difficult to bore holes in certain places in which the circuit had to be run with any of the usual types of tools. In cases of this sort I have found it convenient to remove the brace and attach a doorknob to the bit. The knob can be fastened by means of the setscrew. When the hole to be made is small and the bit sharp, this sort of tool works nicely.

J. J. Aukenbrandt.

Porch-Lamp Control.

For a porch or hall light it is always best to have a switch inside, but there is another way which is cheaper and quite handy. Bore a hole in the wall and insert a metal tube in same. Use a pull-chain socket and run the chain through the tube, the chain being long enough to hang down the wall inside for some distance, so it can be reached. Round off the inner end

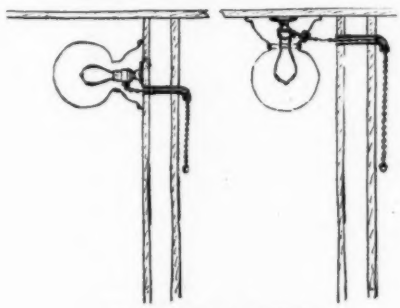


Fig. 2.—Plan of Control.

of tube by filing, or, better still, make a downward bend on the tube so the chain will slide through easily. For a ceiling light it is necessary to make a hole for the chain in the side of shade-holder. Insert a bushing in this so the chain will not catch on the edges, or make the hole very large so the chain will not touch the edges when no bushing will be needed.

C. M. Frykman.

Stripping Flexible.

I offer the following kink which should prove helpful to fellow workers in making up drop cord. Instead of scraping the insulation off the ends of the stranded lamp cord with a knife in the old-fashioned way, often cutting the strands, to say nothing of getting the latter stuck in the fingers, with a little practice the same operation can be done with ordinary electrician's pliers with a single stroke for each wire. Hold the pliers lightly, and with but a slight pressure of the cutting portion of the pliers on the insulation where the same is to be removed, and with a jerk of the pliers toward the end of the wire the insulation comes off quite readily. It will be found surprising how easy and quickly this can be done with very little practice. The same method applies to No. 14 solid wire as well.

H. Piccard.

Sharpening a Brick Drill.

In sharpening a home-made brick drill, made by cutting rip-saw-shaped teeth in the end of a piece of gas pipe, *don't* try to do it with an ordinary three-cornered file. Take a half-round file. You can cut better teeth, and do it quicker and easier, and for this reason will sharpen the drill as often as needed instead of waiting till all semblance of teeth is about gone, as many men are prone to do.

C. W. Goddard.

Setting Floor Boxes.

When floor boxes are set in marble, tile, mosaic, terraza or similar floors, the following method of setting has been found to be the neatest and best yet tried. The accompanying figure gives the setting part. Screw a long flat board to the top of the adjusting ring, after allowing for brass plate and rubber gasket, so that it bridges the gap in the floor. Fill groove of box-

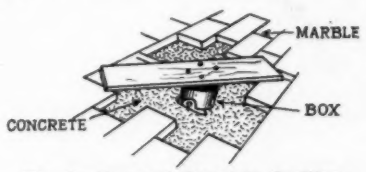


Fig. 3.—Box and Board in Position.

body nearly full of cement, and press iron ring down into cement until ends of board rest on floor; allow to stand until cement is set hard enough to be safe; remove bridge and fasten on gasket and cover.

When a quick setting is required, ammonia should be mixed with the cement instead of water. This causes the cement to dry in about 45 minutes.

W. F. Dimelow.

Temporary Small Pulley.

An electric motor had to be sent to the shops to be repaired, and another was put in its place temporarily. This ran too fast, and a smaller pulley to fit the shaft could not be found. An ingenious garage man took a pipe coupling and drove a wooden plug into it, then boring out the plug for fitting on the motor shaft. The key held this perfectly

C. W. Goddard.

Public Service Commissions

WISCONSIN.

The Commission is in receipt of a complaint from the Madison Gas and Electric Company in which it is alleged that the recent ordinance passed by the City Council requiring the removal of poles and wires from certain streets about to be paved is unreasonable and arbitrary. The complaint sets forth that the company has at a considerable expense complied very recently with a similar ordinance affecting certain streets in the business district and that to require the expenditure of a considerable sum for underground construction upon purely residence streets at this time would be unjust and oppressive. It is not unusual for the Commission to declare a city ordinance invalid on the grounds of unreasonableness and such an action was recently taken relative to an ordinance requiring the extension of water mains in the city of Beloit.

The city of Waupaca, being dissatisfied with the Commission's decision in the matter submitted to it for arbitration by the municipality and the Waupaca Electric Light and Railway Company, has petitioned for a re-hearing in the matter. The original question involved the substitution of inclosed alternating-current arcs for open direct-current arcs where a contract called for lamps of "2,000 candlepower." The city refused to pay the lighting bills on the ground that the terms of the contract were not being complied with. In its original decision on the matter, the Commission held that although the inclosed arcs were inferior in point of candlepower, they were superior to the open arcs as far as satisfactory service was concerned, and in its opinion the company had substantially performed its part of the contract although not fully complying with its exact terms. If any damage had resulted to the city in consequence of the substitution it was held to be too small to admit of exact determination. In denying the city's application for a re-hearing, the Commission stated that the city was not entitled to any refund on past payments on account of the inferior candlepower of the inclosed arcs as claimed by the city in its application.

The Mineral Point Telephone Company has been authorized to increase its switching charge from $1.50 per phone per month to $2.00 per month. The increase will affect about twenty rural lines now receiving switching service through the Mineral Point exchange. The company testified that considerable difficulty is being experienced in giving satisfactory service on account of the overloaded condition of many of the rural lines and because of the fact that they all employ the grounded return, while the city system is metallic. In this connection, the Commission authorized the company to refuse switchboard connections in the future to any rural line that was not fully metallic and which had more than ten subscribers to the line.

The Commission has authorized the Chippewa Valley Railroad, Light and Power Company to abandon its schedule of flat rates now in effect in one of its outlying districts and to substitute therefor a primary charge of 12.5 cents per kilowatt-hour for the first 50 hours' use per month of the active connected load; a secondary charge of 8 cents and an excess charge of 4.5 cents. While this change was made primarily to effect an equalization of rates, it will result in a general reduction in rates, except in a few isolated cases.

NEW YORK.

The Public Service Commission, First District, has received from the secretary the report of gas and electric meters tested during the month of May, 1912. The report showed that 33,319 gas meters and 67 electric meters had been tested. Of the gas meters, 294 were tested on complaint and 6,192 were new meters. All of the electric meters were tested on complaint.

The Public Service Commission, Second District, has authorized the Niagara Falls Power Company to issue its stock or bonds to the aggregate amount of $3,567,000. The company may issue either stock or bonds, but is required to advise the Commission which it proposes to do. Either stock or bonds which may be issued are to be sold at not less than par.

The Commission has received a petition from the Adams Electric Light Company asking for permission to take over all of the property and assets of the Adams Electric Light Company, Limited, including franchises. The petition also asks for the necessary approval of franchises, permission to commence construction, and authority to issue $30,000 of bonds, the proceeds from which are to be used for making improvements and betterments, and $18,000 of its common capital stock for the purchase of the property and assets of the Adams Electric Light Company, Limited.

The Commission has approved the following type of direct-current commutator and mercury motor meters for use in the Second Public Service District of the State: Duncan Electric Manufacing Company, two-wire commutator meters, model E; General Electric Company, two-wire commutator meters, types C, C-6 and C-7; Sangamo Electric Company, two-wire mercury motor meters, types D and D-4; Westinghouse Electric & Manufacturing Company, two-wire commutator meters, type "Direct Current"; Willis Electric Meter Company, two-wire commutator meters, type "Straight Line." Provided that the approval of the above types applies only to their use for measuring energy in direct-current, constant-potential circuits; and further provided that the manufacturer's type designations given herein shall be understood to apply only to meters conforming in design and construction to the samples of such meters kept by the Commission as records of the type.

OKLAHOMA.

A general test of the legality of the action of the Pioneer Telephone Company in establishing unusual rates in Oklahoma is to be made by the Commission in the case filed by E. S. Lowther, of Guthrie. In Guthrie the company raises the rate for subscribers 25 cents per month for each quarter-mile beyond the first mile. That is the plan which is in vogue in all of its Oklahoma exchanges except Oklahoma City, Muskogee, Tulsa and Enid. In those four cities the extra charge is made for each half-mile beyond the first mile. The Commission contends that the company has no right to make such distinctions and that it must give all patrons in the same city the same rate.

In the case of Z. D. Yeaton against the Chickasha Gas & Electric Light Company, involving Yeaton's request for an extension of the company's distribution line to his property, it is agreed that Yeaton is to pay the expense of the poles and wires for the extension, while the company will furnish the labor for its construction. He is then to be credited by the company with the amount of his monthly bills until his expenditure is covered.

Program of Meeting of American Institute.

The twenty-ninth annual convention of the American Institute of Electrical Engineers will be held in Boston, Mass., June 24 to 28, with headquarters at the Hotel Somerset, where a reception and dance will be given on Monday evening.

The opening session will be on Tuesday morning, followed by a High-Tension Transmission Session. A parallel session will be held by the Electrochemical and Electrophysics Section.

The afternoon will be devoted to a visit to the local power stations. In the evening there will be a concert.

On Wednesday morning there will be a joint meeting with the Illuminating Engineering Society, followed by a Railway Session. In the afternoon there will be visits to the Massachusetts Institute of Technology and to Harvard University. In the evening the Section Delegates will meet.

On Thursday morning parallel sessions will be held for Telegraphy and Telephony, and for a joint meeting with the Society for the Promotion of Engineering Education. A short Railway Session follows. In the evening a banquet will be held and the Edison Medal presented.

Friday morning and afternoon will be occupied with parallel sessions on Electrical Measurements and on Power Station and Industrial Power.

There are 58 papers to be presented at the convention, as follows: "Determination of Corona Losses at High Potential," by C. F. Harding; "Dielectric Strength of Air II," by F. W. Peek, Jr.; "Electric Strength of Air III," by J. B. Whitehead; "Measurement of Voltage and Current over a Long Artificial Transmission Line at 25, 60 and 420 Cycles per Second," by A. E. Kennelly and F. W. Lieberknecht; "Electrolytic Corrosion of Iron in Street Soils," by A. F. Ganz; "The Electric Furnace," by F. A. J. FitzGerald; 'Simplification of Electrothermal Calculations; the Watt and Thermal Ohm," by Carl Hering; "Vacuum," by W. R. Whitney; "Metallic Tungsten and Some of its Applications," by W. D. Coolidge; "Characteristics and Applications of Vibration Galvanometers," by Frank Wenner; "The Convection and Conduction of Heat in Gases," by Irving Langmuir; "Problems of Interior Illumination," by Bassett Jones, Jr.; "Relations of Illuminating Engineering to Electrical Engineering," by Louis Bell; "Demonstration of Some of the Relations of Color to Illumination Work," by Herbert E. Ives; "Industrial Illumination and Average Performance of Lighting Systems," by C. E. Clewell; "Discussion on Relation of Central Station Generation to Railway Electrification," by Samuel Insull; "Introduction, Defining Scope and Purpose of Report of Educational Committee," by J. P. Jackson; "Industrial Education as Applicable by Electrical Manufacturing Corporations to Their Own Organization," by Charles P. Steinmetz; "A Few Successful Types of Vocational or Industrial Education in the New England and Middle States, and Railroad Schools," by Henry H. Norris; "Telephone and Electric Operating Companies and Other Industrial Schools in and About New York City," by Samuel Sheldon; "The Important Features of State Laws Relating to Publicly Supported and Controlled Vocational or Industrial Schools," by Walter I. Slichter; "Organization of the Technical College as Related to Its Usefulness to the Industries," by Ralph D. Mershon; "History and Development of Submarine Signaling," by H. J. W. Fay; "The Wiring of Large Buildings for Telephone Service," by Fred L. Rhodes; "The Vibrations of Telephone Diaphragms," by Charles F. Meyer and J. B. Whitehead; "Military Telegraph Lines Using the Polarized Sounder as Receiving Instrument," by George R. Guild; "Measuring Stray Currents in Underground Pipes," by Carl Hering; "Electrical Transmission of Electrical Measurements," by O. J. Bliss; "Metering Large Direct-Current Installations," by F. V. Magalhaes; "A Tubular Electrodynamometer for Heavy Currents," by P. G. Agnew; "Measurement of Alternating Current of Low Value," by M. G. Newman; "Electrical Measurements with Special Reference to Lamp Testing," by Evan J. Edwards; "To Measure an Alternating-Current Resistance and Compare It with the Direct-Current Resistance," by Edwin F. Northrup; "Measurement of Energy with Instrument Transformers," by Alexander Maxwell; "Induction-Type Indicating Instructions," by Paul MacGahan; "The Squirrel-Cage Induction Generator," by H. M. Hobart and E. Knowlton; "Power Efficiency of Rotating Electrical Machines," by E. M. Olin; "Operating Characteristics of Large Turbo-Generators," by A. B. Field; "Motor Starting Currents as Affecting Large Transmission Systems," by P. M. Lincoln; "Characteristics of a Large Unipolar Generator," by B. G. Lamme; "Single-Phase Induction Motors," by W. J. Branson; "Excitation of Alternating-Current Generators," by D. B. Rushmore; "Compensating Wattmeters," by A. L. Ellis; "Potential Transformer Testing," by J. R. Craighead; "Measuring Permeability with Alternating Current," by L. T. Robinson and John D. Ball; "Measuring Maximum Values in High-Voltage Testing," by C. H. Sharp and F. M. Farmer; "Hot-Wire Instruments," by A. W. Pierce and M. E. Tressler; "Incandescent Lamps as Resistances," by T. H. Amrine; "Resonant-Circuit Frequency Indicator," by W. H. Pratt and D. R. Price; "Wheatstone Bridge—Rotating Standard Method of Testing Large-Capacity Watt-Hour Meters," by C. H. Ingalls and J. W. Cowles; "The Testing of Instrument Transformers," by P. G. Agnew and F. B. Silsbee; "Localizers, Suppressors and Experiments," by E. E. F. Creighton and J. T. Whittlesey; "The Runaway Speed of Waterwheels and Its Effect on Connected Rotary Machinery," by Daniel W. Mead; "Relay Protective Systems," by L. L. Elden; "The Transient Reactions of Alternators," by W. A. Durgin and R. H. Whitehead; "Application of Electric Drive to Paper Machines," by E. C. Morse; "Electric Drive for Paper Machines," by J. S. Henderson, Jr.; "Electricity on the Farm," by Putnam A. Bates.

Bi-monthly Meeting of Central Electric Railway Association.

The bi-monthly meeting of the Central Electric Railway Association, held at the Breakers Hotel, Cedar Point, Ohio, June 13 and 14, was the most enjoyable meeting ever held by the Association.

The first session of the meeting was called to order at 9 a. m., W. S. Whitney presiding. Under the head of standing committees H. H. Buchman reported that at a meeting of the Committee the differences in standards between the Central Electric Railway Association and of the American Electric Railway Engineering Association were considered and the standards best suited to the Central Electric Association were recommended.

The first paper was read by M. B. Lambert, of the Westinghouse Electric & Manufacturing Company, on "Split-Frame Motors Versus Box-Frame Railway Motors." Among other things Mr. Lambert said that it is generally agreed that the box frame for railway motors above 75-horsepower capacity is preferable on account of the weight, space and stresses, but for sizes below this there seems to be a divided opinion with the majority favoring the split frame.

An interesting paper was next presented by A. J. Boardman on "Interurban Traffic Analysis and Its Relation to Time Tables."

A paper prepared by W. B. Milligan on "Sale of Current to Small Municipalities and Industries Along the Line" was read by F. D. Carpenter.

J. G. Swain concluded the program by reading a paper on "Transmission Lines Versus Foreign Low-Potential Lines." The next bi-monthly meeting will be held at St. Joseph, Mich.

New Electrical and Mechanical Appliances

The Universal Maxometer.

One of the interesting exhibits at Seattle last week was a new maximum-demand indicator that can be used with any type or make of watt-hour meter, or where a mechanically connected attachment, such as the Maxicator, is not applicable. The new device has appropriately been called by the name Universal Maxometer. It is manufactured by the Chicago Electric Meter Company and is sold exclusively by the Minerallac Electric Company, Chicago, Ill.

The Universal Maxometer has been especially developed to satisfy the need for a maximum indicating device on loads under 50 horsepower, which may be used with any watt-hour meter, exclusive of those to which the company's Maxicator is directly applicable. The Maxicator was described in these columns in the issue of March 23, 1912.

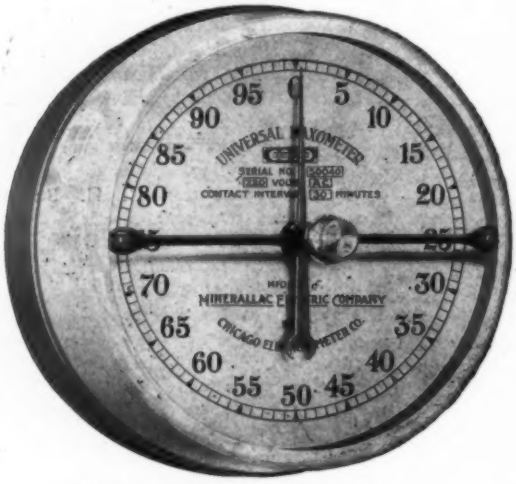


Fig. 1.—Front View of Maxometer.

The new instrument is interlocked electrically instead of mechanically with the meter, and is mounted in a separate case (Fig. 1), connection to the meter being obtained through the use of two small wires. The impulses transmitted to the Maxometer are derived through the use of the standard contact-making commutator (Fig. 2) mounted upon one of the spindles of a standard meter register.

This commutator closes the circuit of the solenoid contained within the Maxometer at a rate directly proportional to the consumption of energy passing through the meter. The energization of this solenoid drives forward two pointers, the first being termed the "set-back pointer" and the second the "friction indicating pointer." The set-back pointer is in contact with the friction pointer and during the forward motion will drive the friction pointer at exactly the same rate. At the end of the half-hour interval, however, the set-back mechanism is released and automatically returns the first pointer to zero, the friction pointer remaining at its former position. The set-back pointer, when it arrives at its first position, is again re-engaged with the advancing mechanism and travels forward exactly as before, being set back at the end of a half hour. If the consumption of energy through the meter has been less in the second interval than in the first, the set-back pointer will not move to the position of contact with the friction pointer, and will therefore not change its indication. If, however, the consumption has been greater, the friction pointer will be picked up and carried to a more advanced position, where it will be again left. The friction or indicating pointer, will, at the end of any time such as a week or month, thus indicate the maximum amount of travel of the set-back pointer, which is the indication of the maximum demand.

One of the most important features of this device is the elimination of the clock mechanism. The Universal Maxometer contains a calibrated constant-speed induction motor, which furnishes the power required to operate the set-back mechanism at one-half-hour intervals. This is a two-pole, self-starting, single-phase motor of the squirrel-cage type, which is wound for 110 or 220 volts, 60 cycles. The moving element runs at a constant speed and through a worm gearing, the speed is reduced to a spindle which makes a contact in each half hour. The energy consumption of this motor on full load, is approximately 7.5 watts.

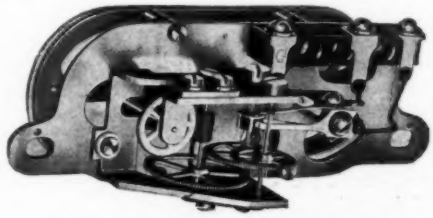


Fig. 2.—Contact-Making Commutator.

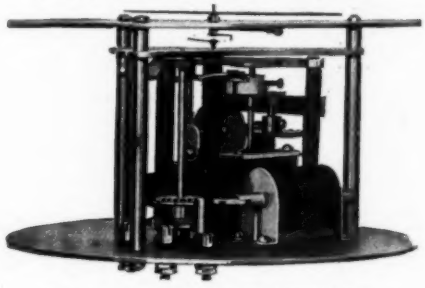


Fig. 3.—Internal View of Maxometer.

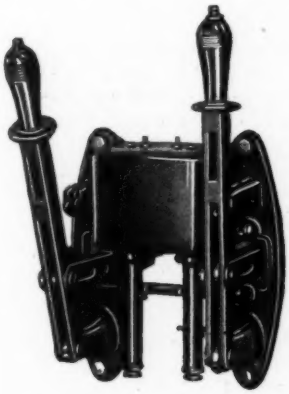
A special type of bearing is used, which requires no oiling, thus making possible the operation of the device for approximately two years without attention.

New General Electric Oil Switches.

A new oil switch, known as the type F, form K-5, which has lately been introduced by the General Electric Company for moderate rupturing capacities and voltages up to 7,500, contains features necessary for reliability and long continued successful operation. The switches are made non-automatic and automatic, hand and solenoid operated, and for mounting on switchboard panels, panel pipes, pipe framework, flat surfaces or in cells. These switches

are already made in 300, 500 and 800-ampere sizes for 600 volts; 200 amperes at 4,500 volts; and 300 and 500 amperes at 7,500 volts. For most of these sizes the switches are made double, triple or four pole and both single and double throw. For 7,500 volts they are also made single pole.

Automatic tripping on predetermined abnormal conditions is accomplished by current transformers and relays for all voltages, or by series trip coils on the switches themselves for potentials up to 2,500 volts. The double-throw switches consist of two single-throw units with a common frame and oil vessel. The operating levers are equipped with a single mechanical lock so arranged that one set of contacts only can be closed at one time. The switches occupy small space, are substantially constructed and receive before shipment a high-potential test depending on the rating, but in no case less than three times the normal voltage of the circuit on which they are to be used. The insulating bushings are of one-piece removable porcelain and the contacts are of the standard sliding-wedge type.



Double-Throw Oil Switch.

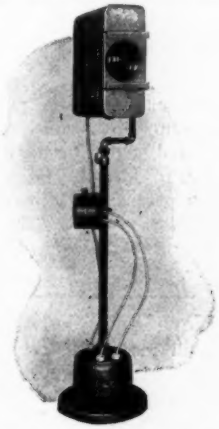
The Transpotarc for Theatrical Spot Lights.

The Fort Wayne Electric Works has lately developed the "Transpotarc," which, as the name suggests, is a transformer for spot-light arc lamps. The spot and flood lamps in general use in all well equipped theaters require a voltage of 35 volts at the arc, such voltage usually being obtained from the commercial alternating-current lighting-circuit supply of 110 or 220 volts, by the insertion of resistance in series with the lamp. The use of the resistance is not only wasteful of energy, but is a constant source of danger, for the heat generated is liable to ignite the scenery and other inflammable materials on the stage. The Transpotarc has been designed to eliminate this fire risk and at the same time conserve the electrical energy formerly wasted as heat.

The Transpotarcs are rated at 1.5 kilowatts and are supplied for service on either 110 or 220-volt, 60 or 133-cycle circuits. The winding is made up with the same care and quality of insulation that is used in high-voltage transformers. The core is made from silicon sheet-steel laminations similar to those used in standard transformer construction. Both core and coils are first insulated and then impregnated with a waterproof compound by means of a vacuum treatment. The ample use of high-grade materials secures high efficiences and consequent low operating temperatures.

A point of special value is the fact that if the lamp terminals be short-circuited the current will only rise to a small amount above normal. With the Transpotarc there can therefore be no dangerous flow of current under any possible condition of service.

The general appearance of the Transpotarc is clearly shown in the accompanying illustration. As may be noted, the Transpotarc serves as a base for the lamp, being especially adapted to the standard pipe support used on the usual spot and flood lamps. The apparatus is designed to stand up under the rough usage which such apparatus receives.

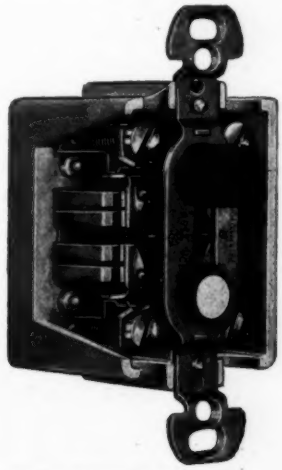


Fort Wayne Transpotarc.

Aside from the elimination of fire risk attendant upon the use of resistances with spot and flood lamps, the Transpotarc saves approximately two-thirds of the energy required to operate the lights with the old-style resistances in series with the lamp.

New Cutler-Hammer Flush Wall Switch.

The line of switch specialties made by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has again been augmented by the addition of a new flush wall switch. The casing in which the mechanism of this switch is placed is made of the new insulating material developed in the ceramic laboratory of the company. This material is claimed to have all of the good points of porcelain with none of its defects. It is of uniform quality, is tough, can be accurately molded and insures permanent alinement of operating parts. The simple mechanism used in the Cutler-Hammer pendent and surface switches has been adapted for this flush switch. This mechanism is evenly balanced on two steel balls and there is no objectionable rotating member but a simple reciprocating contact piece. Each side of this piece makes and breaks the circuit on four contacts. This reduces wearing to a minimum and and insures a large overload capacity. The stroke of the buttons is short and in a straight line. The steel parts are copper-plated to prevent rusting and the mounting lugs will fit all standard outlet boxes. The rating is 10 amperes, 250 volts, and each switch bears the label of the Underwriters' Laboratories. Flush plates in standard finishes are made for use with these switches, but all universal plates are applicable. The same casing is used for single-pole, double-pole and three-way switches.



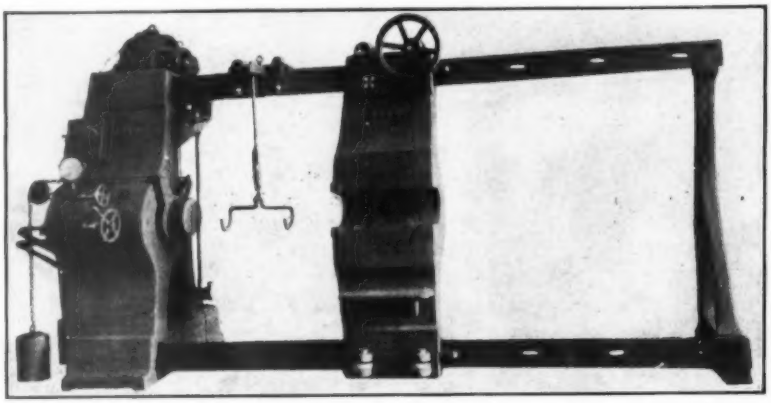
Cutler-Hammer Wall Switch.

Automatic Telephony in England.

The first public automatic telephone exchange in England was opened at Epsom, near London, on May 20. Although equipped for only 400 lines, this installation is important because the British Post Office Department is favorably impressed with the possibilities of automatic telephony and, if this exchange proves to be as successful as present indications seem to show, it is very likely that automatic equipment will be extensively used throughout Great Britain. The equipment was installed by the Automatic Telephone Manufacturing Company, Limited, and is of the Strowger-Keith type manufactured by the Automatic Electric Company, Chicago.

A Motor-Driven Hydraulic Wheel Press.

Besides being used in all car and locomotive works a wheel press is now considered indispensable to the equipment of steam and electric railways, lumber yards, coal yards and mines, machine shops, foundries, cement plants, ship yards, dock companies and many other concerns using considerable machinery or rolling stock.



Motor-Driven Wheel Press.

The motor-operated wheel press shown in the accompanying illustration is probably the most highly perfected one that has been built. Its manufacturers, E. R. Caldwell & Company, of Bradford, Pa., pride themselves on its convenience in operation and simplicity of construction.

For convenience in handling heavy work, such as locomotive drivers and irregularly shaped work that cannot be rolled to and from the press, the upper horizontal parallel bar is not directly above the lower, but at a slight angle which permits handling the work with an overhead crane.

The plungers (not shown in the photograph) are operated by eccentrics on the back shaft which is driven by cut gears having 3.5 to 1 ratio. The plungers operate without vibration and are practically noiseless. The ram is drawn back automatically as soon as the pressure is shut off from the pumps. An extra valve to connect with the city-water line is furnished when it is possible to have such connection. By opening this valve (before using the pressure from the pump) the steel-faced ram is moved out against the work more rapidly than it could be done by the pumps; the city-water line valve is then closed, the pump valve opened and the plungers started.

The press is equipped with low and high-pressure pumps. The low-pressure pump operates the ram up to a certain pressure with a greater speed than the high-pressure pump and consequently increases the amount of work that can be handled by the use of a high-pressure pump alone. This low-pressure cylinder is arranged with a relief valve so that the pump works until about 50 tons pressure is reached, when it automatically cuts out and the pressing operation is continued at a slower rate with the high-pressure pumps.

In pressing-off work this automatic device is especially efficient. The low-pressure pump works until about 50 tons is reached, when the high-pressure pumps begin to operate, and press until the work is pressed off far enough to finish it with low pressure. The plungers are driven by a 7.5-horsepower Westinghouse motor.

A New Pull Receptacle.

A new pull receptacle, known as No. 413, has been placed on the market by Pass & Seymour, Incorporated, of Solvay, N. Y. It may be used as a concealed wall receptacle or in connection with 3, 3.25 or 4-inch outlet boxes. Two sets of holes for supporting screws are provided, one being 2.75 inches on centers and the other 4 inches on centers. A pull chain 18 inches long is supplied.

P. & S. Receptacle With Shurlok and Reflector.

The illustration herewith shows the new receptacle with the Shurlok attachment, Holophane reflector and Mazda lamp. The Shurlok device has been described in these columns in previous issues; it is an unobtrusive locking attachment that securely protects both the lamp and reflector.

Edison-Battery Vehicles Introduced in England.

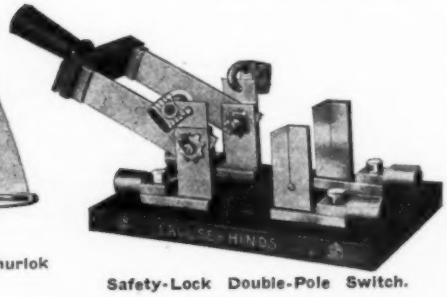
A new organization has been formed in London to introduce all kinds of electric pleasure and commercial vehicles propelled by means of the Edison storage battery. A large salesroom has been established for showing these vehicles. The London central-station authorities are prepared to give the necessary charging facilities, in most cases during both day and night. It is reported that recently an electric truck, with a loaded weight of two tons, made a 60-mile test journey from London on a battery charge of 20 kilowatt-hours.

Safety-Lock Knife Switches.

These switches are of standard type with the addition that one clip of each hinge standard of a two-pole switch and a clip of each outer hinge standard of a switch having three or four poles, is extra high and pierced with a three-eighths-inch hole, centering five-sixteenths inch below the top of clip, to receive the bow of a padlock.

Provision is made for two locks, one for the machinist or motor-tender and one for the repair or lineman. The man about to work on the machine or motor opens the switch, snaps on the padlock and, with the key in his pocket, proceeds with his labor. If the machinist and lineman are at work at one and the same time, each because of his separate lock is fully protected, and the switch cannot be closed till both locks are off.

These switches meet the demand for a switch that cannot be operated by an unauthorized person and thus prevent accidents to repair men and damage to machinery that frequently result from the turning on of power at wrong times. These switches are manufactured by the Crouse-Hinds Company, Syracuse, N. Y.



Safety-Lock Double-Pole Switch.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

GARWIN, IOWA.—An electric light franchise has been granted to J. P. Walters, of Toledo, O. C.

BURLINGTON, IOWA.—The Y. M. C. A. is considering the installation of an electric light plant. C.

NEWTON, N. C.—John Yount, of this place, is contemplating the construction of a hydroelectric plant.

CEDAR RAPIDS, IOWA.—The City Council has under way a movement for an improved system of electric lighting.

SANDERSON, TEX.—Ed. McGinley is preparing to install an electric light plant and ice factory here.

PRESCOTT, IOWA.—An electric light franchise has been granted to the Lee Electric Light Company. C.

VALLEJO, CAL.—The Great Western Power Company has been granted a franchise in Solano County.

SIOUX FALLS, S. D.—Work has started on the power building and $200,000 will be spent on machinery. C.

RICE LAKE, WIS.—The Red Cedar Valley Electric Company proposes to install the "White Way" for $1,965. C.

HASTINGS, FLA.—The City Council has granted a franchise for an electric light plant and street lighting system.

JENA, LA.—H. W. Wright and C. C. O'Malley, Winfield, La., have under consideration the establishment of an electric light plant.

MURPHY, N. C.—Carolina-Tennessee Power Company, New York N. Y., is making plans for the Hiwassee River developments.

HOPEDALE, ILL.—It has been decided to issue $3,200 in bonds for the installation of an electric lighting system in Hopedale.

DALTON, GA.—This city will install an additional unit at the municipal power plant. For further particulars address the Mayor.

MOKENA, ILL.—The Village Board has granted the Public Service Company of Northern Ilinois a franchise to operate in Mokena.

ATHENS, ALA.—This city has voted a $38,000 bond issue for the purpose of installing an electric light plant. A. P. Henderson is the City Engineer.

REDLANDS, CAL.—O. Baldwin, owner of power rights, has offered the right to the city to erect a power plant and develop electricity for street lighting.

PERRY, OKLA.—Arbuckle Canyon Power Company has been incorporated with a capital stock of $10,000 by George A. Masters, R. E. Wade and Charles R. Bostick.

MERRILL, MICH.—The Consolidated Light & Power Company has been given a 30-year franchise to operate in this place. J. L. Hudson is at the head of the company.

LITTLE ROCK, ARK.—The Little Rock Railway & Electric Company has completed plans to place its wires and conduits underground in the business section of this city, and work will be started at once.

CARTERSVILLE, GA.—The city has authorized the issuance of $50,000 worth of bonds for the purpose of extending and improving the municipal electric light plant.

LEXINGTON, KY.—The Transylvania University, of which R. H. Crossfield is president, is raising $100,000 to be used in the construction of a central electric light and power plant. G.

AUGUSTA, ME.—The Central Maine Power Company will build a transmission line from the Fort Halifax power station in Winslow, *via* North Vassalboro, East Vassalboro, to Rockland.

EUREKA, ILL.—The City Council has under consideration the installation of an electric motor to operate pump and electrical connections, which will necessitate an expenditure of $1,000.

GRASS VALLEY, CAL.—The Rio Antigua Mining Company, of Los Angeles, has taken over the entire South Fork properties at Forest City, and will install an electric plant to supply lamps and electric motors for the company.

LOUISVILLE, KY.—The Louisville Artificial Limb Manufacturing Company, with offices at 429 West Jefferson Street, is in the market for motors for the operation of its woodworking machines. G.

ALAMEDA, CAL.—Plans are being prepared for the new fireproof building for the city's electrical works. It is planned to install a 650-horsepower engine and a 1,200-kilovolt-ampere steam turbine generator.

BILOXI, MISS.—Anderson Offutt, electrical engineer of New Orleans, La., has submitted an estimate to the Council of this place on the cost of a municipal lighting plant calling for an expenditure of $75,000.

MILLVILLE, N. J.—At a recent meeting of the Millville City Council it was decided to engage the sevices of an engineer to have in charge the erection of a municipal electric lighting system.

SAN LUIS OBISPO, CAL.—Sealed bids will be received by the Board of Supervisors until July 2, for the sale of a 50-year franchise to construct and operate electric transmission lines over certain highways in the county.

RICHMOND, VA.—The Southwestern Utilities Corporation has been chartered here for the purpose of owning public utilities such as electric light plants, etc. The capital stock is $15,000,000. Thomas B. Day is president and H. H. Chalkley is treasurer.

LINCOLN, NEB.—The Commonwealth Development Company has filed articles of incorporation with a capital stock of $7,500,000. The purpose of the company is to carry out a power development scheme between Columbus, Lincoln and Omaha.

SPRINGFIELD, MASS.—The Municipal Building Commisison is asking bids for lighting fixtures for the auditorium tower and terrace of the new municipal buildings. For further information apply to Clerk of Works, Pynchon Street, Springfield.

PRESCOTT, WIS.—A new company has been formed under the name of the River Falls Power Company. B. W. Ulman is president. R. A. Lang, of Eau Claire, will start work on the dam at Clifton and the plant will be in operation in about two months. C.

DEL RIO, TEX.—F. S. Pearson, of New York, and associates have under consideration the construction of a large dam across the Devil's River, about 50 miles north of here, for the purpose of forming a storage reservoir and providing initial energy for a hydroelectric plant and distributing system. D.

KNOXVILLE, TENN.—The Tennessee Exploration Company is reported to be planning the erection of a hydroelectric power plant on Holston River for the purpose of manufacturing current to be used in the operation of a large zinc mill which it contemplates constructing at Mascot, Tenn. G.

NOBLESVILLE, IND.—The Noblesville Gas & Electric Company has been incorporated to supply the city of Noblesville and adjacent towns with light, heat, and power. It will operate as a utility company. Cyrus R. Heath, Royland S. Truitt and Fletcher S. Hecath, are the directors. S.

FREEPORT, ILL.—The Illinois Northern Utilities Company plans to construct a transmission line along the Sterling, Dixon & Eastern Railroad from Dixon to Erie via Sterling, Morrison, Fulton and Tampico. This will enable the company to supply electricity to residents along the route.

SAN FRANCISCO, CAL.—The San Joaquin Light & Power Company has applied for a certificate of public convenience and necessity to enable it to construct an additional transmission line for the purpose of augmenting its supply in the oil districts of Coalinga, Midway, Lost Hills, McKittrick and the Kern River fields.

FORT PAYNE, ALA.—The Little River Power Company, Nashville, Tenn., plans the construction of three water power developments, having a total rated output of 150,000 horsepower. The first of these will be on the Little River near this place and will develop 50,000 horsepower. Energy will be transmitted from this plant to Anniston, Gadsden, Huntsville and neighboring localities.

TOLEDO, O.—A new company has been organized to supply electric power and do electric construction work in

Lucas and Wood Counties and will be known as the Independent Electric & Construction Company. The concern is incorporated with a capital stock of $10,000 and the incorporators are Eugene Rhinefrank, C. J. Lindecker, L. J. Metzger, F. W. Crabbs and N. E. Evans.

KITTANNING, PA.—The Kittanning Power Company, the Clarion Water Power Company and the Butler Water Power Company are behind a gigantic electric power project involving an expenditure of $150,000,000. It is planned to dam several natural reservoirs in the tributaries of the Allegheny River to provide electric power for light, heat, manufacturing and street railway uses throughout Western Pennsylvania.

VISALIA, CAL.—The Mount Whitney Power & Electric Company is installing a 750-kilowatt Curtis steam turbine in addition to its old steam plant. It also has under construction a substation of 15,000-kilowatt capacity at Lindsay, Cal., which is located in the center of the orange grove district of Tulare county, and practically the entire output will be utilized for pumping for irrigation purposes.

ARTESIA, N. M.—John C. Keys, of Oklahoma City, Okla., has purchased a controlling interest in the Artesia Light & Power Company and is preparing to make extensive improvements to the plant. A large amount of additional equipment will be installed and the power transmission lines will be extended. It is announced that the company will spend about $250,000 in improvements and extensions during the next year. D.

LAPORTE, IND.—The United Light & Railways Company, incorporated under the laws of Maine with a capital stock of $12,000,000, has filed articles and been admitted to engage in business in Indiana. The new corporation has taken over the Laporte Electric Company and is preparing to absorb other like companies. William A. Martin, of Laporte, is president, and L. H. Henike, of Grand Rapids, Mich., is secretary. S.

TAMPICO, MEX.—The Mexican Midland Light & Power Company has recently been incorporated in Canada, under the laws of the Province of Ontario, to work the concessions granted to the Compania Hydro-Electrica Mexicana, S. A. These concessions authorize the development of the waterfalls of the Rio Naranjo and the Rio Blanca for the purpose of generating electric power. The acquisition of these concessions, it is stated, secures for the company the right to transmit power anywhere throughout the republic. D.

PITTSBURGH, PA.—Definite plans for the construction of a hydroelectric development near this city, by the American Water Works & Guarantee Company and interests allied with that concern, will probably be announced soon. For some time the work of acquiring water-power sites along the Cheat River, within 50 miles of Pittsburgh, has been going on. It is said that with the property and rights now held, a total of more than 100,000 horsepower can be developed when the installation is complete. The American Water Works & Guarantee Company recently issued $10,000,000 in six-percent cumulative participating preferred stock. It is understood that part of this amount will be used for this development.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

BALFOUR, N. D.—The Alfalfa Telephone Company will erect a pole line between here and Towner. C.

BILLINGS, MONT.—The Mountain States Telephone Company plans to make improvements to its system in this city.

ALPINE, TEX.—The Pecos & Rio Grande Telephone Company is preparing to commence construction of a line from Alpine to Marfa.

ECHO, MINN.—The Rock Vale Telephone Company has been organized with F. W. Chapman, president, and Oscar Gryting, secretary. C.

LANCASTER, MINN.—The Farmers' Two Rivers Telephone Company will extend its lines this year and overhaul the entire system. C.

OGILVIE, MINN.—A new telephone line will be built in Northfork to connect with the Ann Lake line. C.

AUBURN, GA.—The Auburn Telephone Company has been organized to construct a telephone system. B. O. Cosby is secretary-treasurer of the company.

BRECKTON, KY.—Breckton Telephone Company has been incorporated with a capital stock of $500 by Ed. Redford, Morgan Gilleck and George Lewis.

ARNETT, OKLA.—Arnett Telephone Company has been incorporated with a capital stock of $10,000 and has been granted a permit to engage in business in Texas.

ORANGE, CAL.—The Pacific Telephone & Telegraph Company has been granted a 45-year franchise to erect and operate telephone lines over the public highways of this place.

ASTORIA, ORE.—The Clatsop Cranberry Company has arranged with the local telephone company to install a complete metallic service between Astoria and Clatsop.

DES MOINES, IOWA.—C. G. Williams, of the Electric Automatic Company of Chicago, has under way a proposition in regard to installing an automatic telephone system at this place. C.

STRINGTOWN, OKLA. — Citizens Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are O. A. Moody, M. R. Winters and O. C. Elkins, all of Stringtown.

FRAZEE, MINN.—The Frazee Telephone Company has been incorporated with a capital stock of $11,000 by E. F. Gummer, C. L. Gummer, W. F. Just, M. C. Swain and I. L. Swain, all of Frazee.

INTERNATIONAL FALLS, MINN.—The International Falls Telephone Company is asking for bids on material to construct a long-distance line to connect with the Northwestern Company's line at Blackduck. C.

ARKADELPHIA, ARK.—R. B. F. Key, C. C. Henderson, T. N. Wilson and R. C. McDaniel are interested in a company which has been organized with a capital of $25,000 for the purpose of constructing a telephone line.

WHITE SALMON, WASH.—The Farmers' Union Telephone Company of Trout Lake has been organized and will soon incorporate with a capitalization of $50,000. Stock is being sold for a line to connect with Underwood and from there to Hood River.

ALBANY, N. Y.—The Wireless Liquidating Company, of New York, has been incorporated with a capital stock of $1,700,000. The directors are Arthur P. West, R. M. Owen and George W. Whiteside, New York; George L. Fox, Fair Haven, Conn.; A. A. Du Ban, Philadelphia.

VERSAILLES, IND.—The Farmers Mutual Telephone Company, of Rexville and vicinity, has been incorporated to build a new telephone system. Bids for material and expert labor will be received by the company at Versailles. J. M. Lewis, Michael Hockersmith, G. H. Delay and J. H. Craig are the directors.

ELECTRIC RAILWAYS.

(Special Correspondence.)

DAVENPORT, IOWA.—A franchise has been granted to the Davenport Interurban Company. C.

DES MOINES, IOWA.—The Inter-Urban Railway Company contemplates extending its present line from Woodward to Fort Dodge.

STOCKTON, CAL.—The Stockton Terminal & Eastern Railway has been granted permission to issue $65,000 in bonds, part of the proceeds of which are for extensions and improvements

WASECA, MINN.—The Commercial Club has appointed a committee to raise $1,600 by subscription for the proposed electric road to Sioux Falls, which is being promoted by W. H. Knight, of Chicago. C.

INDIANAPOLIS, IND.—A contract has been closed by the Indianapolis Construction Company with capitalists in Houston, Tex., for the construction of 242 miles of standard-gauge electric railway to connect Houston and Texarkana. The deal is said to involve an expenditure of $4,000,000. S.

ELIZABETHTOWN, TENN. — An electric line 10 miles long will be built from this place to Johnson City by the Milligan, Elizabethtown & Johnson City Electric Railway Company. J. G. Burchfield, of Elizabethtown, who is president of the company, states that arrangements for all of the necessary rights of way have been completed. G.

INDIANAPOLIS, IND.—The Vermillion Traction Company, which has been formed to build and operate an electric interurban road from Terre Haute through Clinton, Hillsdale, Dana, Newport, Cayuga and Perrysville, Ind., to Ridge Farm, Ill., has filed articles of incorporation with the secretary of state, with an authorized capital stock of $25,000, to be increased to half a million. S.

TOLEDO, O.—The Toledo & Eastern Traction Company, of Toledo, has been incorporated with a capital stock of $40,000. The incorporators of the new company are R. S. Holbrook, Wm. S. Holbrook, H. H. Whitney, Joseph Steiner, and Arthur J. Barton. It is expected to build an electric line from Curtice, O., to Bono, O. The road will connect with the Wheeling & Lake Erie at Curtice for freight business and gasoline motor cars will be run into Toledo. H.

SALT LAKE CITY, UTAH.—The Southern Pacific Railroad has appropriated $125,000 to cover the cost of installing an alternating-current automatic-block signal system across the Lucin cut-off near this city. The system will extend 20 miles on the East side

of the long trestle and for approximately 24 miles on the west side. The power will be supplied from the company's shops at Ogden and a special power plant will be erected at Lemay to take care of the west end of the alternating system.

SAN ANTONIO, TEX.—F. S. Pearson, of New York, head of the Medina Valley Irrigation Company which is constructing a system of irrigation in the valley of the Medina River, says that the same interests have under consideration the project of building an interurban electric railway from San Antonio through the property that is to be irrigated and colonized. The proposed line will be about 40 miles long and one of its purposes is to develop a pleasure resort at the large lake that is to be formed by the construction of a dam across the Medina River, which work is now under way. D.

CRAWFORDSVILLE, IND.—The Crawfordsville & Danville Interurban Company has filed articles of incorporation on initial capital stock of $5,000. The declared object of this corporation is to promote, finance, construct, equip and operate an electric railway between Crawfordsville, Ind., and Danville, Ill., and to construct plants for the creation and distribution of electricity for heat, light and power. The incorporators and directors are J. W. Black, Charles McCabe, E. G. McCormal, W. D. Gott, A. M. Boyles and W. A. Johnson. The company's place of business will be Kingman, Ind. S.

NEW INCORPORATIONS.

CHICAGO, ILL.—Anderson Thrail Company has been incorporated with a capital stock of $7,500 by George W. Brown, E. H. Bjornberg and Alfred H. Pouse. The company will engage in electrical work of all sorts, batteries, machinery, etc.

NEW YORK, N. Y.—Bronx Electric Protective Patrol, Incorporated, has been incorporated with a capital stock of $5,000 by Max Katz, Louis Katz and Gottlieb Haneke, New York City. The company will install electric burglar-alarm devices, etc.

BRILLIANT, O.—The Jefferson Electric Company has been incorporated with a capital stock of $10,000 by Alonzo M. Snyder, Irvin K. Schnaitter, Roy R. Moffet, W. J. Budd and H. Melvin Roberts. The company will engage in the electric light and power business.

CHICAGO, ILL.—Electrical Machinery Sales Company has been incorporated with a capital stock of $5,000 for the purpose of manufacturing and dealing in electrical machinery. The incorporators are George Heidman, R. E. Wighton and Norman A. Street.

BROOKLYN, N. Y.—United Electric & Sewing Machine Company has been incorporated with a capital stock of $2,100 for the purpose of manufacturing electrical devices. The incorporators are Hyman Yondelman, Nathan Cohen and Mark Lang, all of Brooklyn.

NIAGARA FALLS, N. Y.—Esco Sales Company has been incorporated with a capital stock of $10,000 for the purpose of manufacturing and dealing in electrical devices for automobiles. The incorporators are Joseph Dovesmith and Spencer B. Parker, Niagara Falls; and Chris Gombert, La Salle, N. Y.

FINANCIAL NOTES.

Speculative dullness has ruled the market for the past week, and this is as it should be, pending the outcome of the present political situation. Fundamentals continue to improve, with iron and steel industries forging to the fore. Notwithstanding a disappointing crop report, based on Government figures, physical indications point to a bounteous crop and plenty of money in the hands of the farmers this fall. All through the Dakotas and Montana, wheat, rye, oats, and flax are in flourishing condition, with the soil in better shape than it has been for years.

The annual report of the Marconi Company, which has been awaited with interest, is now out. It shows net profits of $708,585 for 1911, against $307,565 for 1910. The directors state that but for the fact that business completely outgrew the company's Chelmsford works the profits would have been larger.

A final dividend of one per cent on both classes of shares was declared, making 17 per cent for the year on the preference stocks and 20 per cent on the ordinary. For the current year a first interim dividend of seven per cent on the preference shares and 10 per cent on the ordinary shares is announced.

At the annual meeting of the Westinghouse Electric & Manufacturing Company retiring directors were re-elected.

The reorganization committee of the Allis-Chalmers Company has received all but $800,000 of the $11,148,000 Allis-Chalmers bonds. More than eighty per cent of each class of stock has been deposited.

Northern States Power Company has sold to the Guaranty Trust Company $5,000,000 five-year six-per-cent collateral trust notes, dated June 1. Notes are guaranteed, principal and interest, by Consumers' Power Company of Minnesota.

The Massachusetts Board of Gas and Electric Light Commissioners has given the Haverhill Electric Company authority to issue 1,117 shares of additional capital stock at a par value of $100, the proceeds to be used to pay a floating indebtedness incurred in constructions and extensions.

N. W. Halsey & Company and Russell, Brewster & Company, of New York City, are managing the syndicate which has purchased $4,300,000 twenty-year five-per-cent bonds of the United Light & Railways Company, authorized by stockholders on June 1 for purchase of the Tri-City Railway & Light Company, and certain gas properties, for redemption of underlying bonds and to provide working capital.

The Electric Bond & Share Company preferred stockholders have been notified that stockholders of record June 6 will have the right to subscribe pro rata to 15,000 shares of preferred stock at par plus accrued dividends. It is optional with the subscribers to make payments in two installments, one payable June 24 and the other Nov. 1. The common stockholders have agreed to purchase such new stock as shall not have been subscribed for by the preferred stockholders on or before June 24.

That the remarkable expansion of the Stone & Webster properties, on which $13,126,000 was expended for improvements and new construction last year, is to be continued is assured from the estimated outlay for the current year of $12,387,000. This swells the amount expended for this purpose and charged to plant account over the past seven years to December 1 next to $67,836,000. Of this amount, $25,413,000, or 37.4 per cent, has been expended in the last two years. The above covers the expenditures of fifty-seven electric railway, lighting, gas and water-power companies including subsidiaries, but does not include construction for the Mississippi River Power Company.

At the sale of the Sedalia (Mo.) Light & Traction Company, by the receivers, the property was bid in for $400,000 by the bondholders' committee, composed of Otto T. Bannard, Robert T. Sheldon, and Herbert K. Hallett. As soon as the floating liabilities of the company are liquidated and the receivers discharged, the property will be turned over to Henry L. Doherty & Company, who will reorganize it for the bondholders, and take charge of its operation. The new company, to be incorporated under the laws of Missouri, will have an authorized capitalization of $2,500,000 five-per-cent first-mortgage bonds, $500,000 preferred, and $2,000,000 common stock. Of the bonds, $400,000 will be now issued, and also $400,000 of preferred stock. Holders of the $749,000 of the old bonds of the company will be given fifty per cent of their holdings in the new bonds, and fifty per cent in the new preferred stock.

The American Utilities Company, the latest holding corporation in the public-utility field, will begin business July 1 when its common and preferred stocks will be issued. Williams, McConnell & Coleman, of New York City, are now offering $725,000 six-per-cent preferred and $290,000 common stock, in blocks of $1,000 par value preferred, and $400 par value common stock, for $1,000. Both stocks will be issued as of date of July 1. The preferred stock will pay quarterly dividends of 1.5 per cent, beginning with October 1. Stock may be redeemed on any dividend date at 105 and accrued dividends. Dividends of one-half of one per cent quarterly, will be paid on the common stock, beginning October 1. It is expected to increase this common stock dividend one per cent each year, until six per cent is being paid on the stock. The capitalization of the company will consist of $739,000 five-per-cent collateral-trust bonds, $1,714,000 six-per-cent preferred and $2,400,000 common stock.

Dividends.

American Cities Company; a semi-annual preferred dividend of three per cent, payable July 1 to stock of record June 22.

American Gas & Electric Company; a quarterly dividend of 1.75 per cent on the common stock, an increase of one-quarter of one per cent quarterly, payable July 1 to stock of record June 20. The regular quarterly dividend of 1.5 per cent on the preferred stock, payable August 1 to stock of record July 17.

Asheville Power & Light Company; a quarterly dividend of 1.75 per cent, payable July 1 to stock of record June 22.

Aurora, Elgin & Chicago Railroad; a quarterly preferred dividend of 1.5 per cent, and a common dividend of 0.75 per cent, payable July 10 to stock of record June 23.

Bangor Railway & Electric Company; a quarterly preferred dividend of 1.75 per cent, payable July 1 to stock of record June 22.

Boston & Worcester Street Railway Company; a semi-annual preferred divi-

dend of $1 per share, payable July 1 to stock of record June 22.

Butte Electric & Power Company; a quarterly dividend of 1.75 per cent, payable July 1 to stock of record June 18.

Cincinnati Gas & Electric Company; a quarterly dividend of 1.25 per cent, payable July 2 to stock of record June 14.

Cincinnati Street Railway Company; a quarterly dividend of 1.5 per cent, payable July 1 to stock of record June 15.

Colorado Electric Company; a semi-annual preferred dividend of $3 per share, payable July 1 to stock of record June 20.

Consolidated Traction of New Jersey; a semi-annual dividend of two per cent, payable July 15 to stock of record June 29.

Detroit Edison Company; the regular quarterly dividend of 1.75 per cent, payable July 15 to stock of record June 29.

Electrical Securities Corporation; regular quarterly dividends of 1.25 per cent on preferred, payable August 1 to stock of record July 29, and two per cent on common, payable June 29 to stock of record June 28.

Halifax Electric Tramway, Limited; a quarterly dividend of two per cent, payable July 1 to stock of record June 19.

Louisville Home Telephone Company; a quarterly dividend of 1.5 per cent, payable July 1 to stock of record June 26.

Marconi Wireless Telegraph Company, Limited; final dividend at rate of one per cent for last year on ordinary shares and an interim dividend of ten per cent for the current year.

Memphis Street Railway Company; a common dividend of one per cent, and a preferred dividend of 1.25 per cent, both payable June 29 to stock of record June 20.

National Gas, Electric Light & Power Company; a quarterly preferred dividend of 1.5 per cent, payable July 1 to stock of record June 25.

New England Telephone & Telegraph Company; the regular quarterly dividend of $1.75, payable June 29 to stock of record June 15.

New York Edison Company; a quarterly dividend of 1.5 per cent, payable June 14.

Northern Ohio Traction & Light Company; the regular quarterly dividend of 1.5 per cent on the preferred stock, payable July 1 to stock of record June 15.

United Utilities Company; the regular quarterly dividend of 1.75 per cent on the preferred stock, payable July 1 to stock of record June 22.

West India Electric Company; a quarterly dividend of 1.25 per cent, payable July 2 to stock of record June 24.

Western Union Telegraph Company; a quarterly dividend of 0.75 per cent, payable July 15 to stock of record June 20.

Reports of Earnings.

Earnings of the following companies for April, and for the twelve months ended April 30, are reported as follows:

CENTRAL MEXICO LIGHT & POWER CO.

	1912	1911
April gross	$ 38,905	$ 29,748
April net	17,234	12,440
12 months gross	410,795	.....
12 months net	185,013	.....

AMERICAN POWER & LIGHT CO.
(Subsidiary companies.)

April gross	$ 280,373	$ 276,073
April net	127,470	121,138
12 months gross	3,311,025	3,036,348
12 months net	1,447,936	1,316,978

BUFFE ELECTRIC & POWER CO.

April gross	$ 130,596	$ 121,499
April net	75,225	71,194
12 months gross	1,745,152	1,619,225
12 months net	1,078,891	961,477

DULUTH EDISON ELECTRIC CO.

April gross	$ 35,745	$ 34,521
April net	14,165	13,518
12 months gross	460,662	439,920
12 months net	188,184	194,989

FORT SMITH LIGHT & TRACTION CO.

April gross	$ 53,874	$ 41,026
April net	20,198	16,731
12 months gross	605,043	486,597
12 months net	244,045	208,451

GUANAJUATO POWER & ELECTRIC CO.

April gross	$ 58,714	$ 52,445
April net	40,331	40,025
12 months gross	662,955	549,425
12 months net	467,471	420,724

MOBILE ELECTRIC CO.

April gross	$ 31,173	$ 27,524
April net	13,918	13,005
12 months gross	362,134	328,201
12 months net	173,592	157,000

MUSKOGEE GAS & ELECTRIC CO.

April gross	$ 46,396	$ 37,051
April net	16,667	14,803
12 months gross	525,088	412,302
12 months net	213,915	150,406

NORTHERN STATES POWER CO.
(Consumers Powers Operating Co.)

April gross	$ 134,561	$ 121,700
April net	63,083	56,714
12 months gross	1,684,548	1,450,203
12 months net	720,522	610,919

OTTUMWA RAILWAY & LIGHT CO.

April gross	$ 22,786	$ 22,450
April net	9,472	9,658
12 months gross	294,182	273,095
12 months net	135,482	127,556

STANDARD GAS & ELECTRIC CO.

April gross income	$ 135,975	.....
April net income	132,390	.....
12 months gross income	1,733,245	.....
12 months net income	1,701,447	.....

WESTERN STATES GAS & ELECTRIC CO.

April gross	$ 77,564	$ 66,909
April net	41,689	40,163
12 months gross	911,052	775,755
12 months net	514,618	434,137

HAVANA ELECTRIC.

The Havana Electric reports to the New York Stock Exchange for the year ended December 31, 1911, compared as follows:

	1911	1910
Gross	$2,991,553	$2,656,980
Expenses	1,519,303	1,365,641
Net	1,472,250	1,291,339
Charges and taxes	512,213	448,129
Surplus	*960,036	843,210

*After allowing for six per cent on the $5,000,000 preferred stock the balance, $660,036, is equal to 8.84 per cent on the $7,463,630 common stock as compared with 7.3 per cent earned last year.

CONSUMERS' POWER COMPANY.

The Consumers' Power Company, of Michigan, reports for April and for the four months ended April 30:

April:	1912	1911
Gross earnings	$215,813	$187,536
Net earnings	100,270	91,387
Surplus	53,339	51,264
Four months:		
Gross earnings	$915,120	$793,887
Net earnings	431,371	408,550
Surplus	253,685	260,466

CHICAGO TELEPHONE.

The Chicago Telephone Company reports to the New York Stock Exchange for the sixteen months ended April 30, 1912, as follows:

Gross	$17,226,347
General and operating expenses	8,442,110
Repairs and maintenance	5,767,665
Total expenses	14,209,775
Net earnings	3,016,572
Dividends for fifteen months	2,700,000
Surplus	316,572

WESTERN UNION.

The Western Union Telegraph Company has issued its preliminary estimated statement of earnings for the quarter ended June 30, 1912. We compare with the same period of previous years, as follows:

	1912	1911
Gross income	$10,901,850	$.....
*Expenses	9,761,870	.....
Net revenue	1,139,980	1,982,493
Bond interest	347,633	433,953
Balance	792,347	1,548,540
Dividends	748,005	747,887
Surplus	44,342	800,653

*Includes quarterly assessment for repairs and depreciation, pursuant to resolution of January 31, 1912, that there be appropriated for 1912, in equal quarterly installments out of earnings the sum of $3,400,000 for repairs and maintenance, and $5,000,000 (in such quarterly installments as may be determined) for reconstruction and depreciation reserve.

AMERICAN CITIES SUBSIDIARIES.

Statements of the subsidiary companies of American cities for year ended December 31, 1911, and for three months ended March 31, 1912, show:

MEMPHIS STREET RAILWAY CO.

	Year 1911	1st Quar. 1912
Gross earnings	$1,890,495	$430,749
Net earnings	700,659	151,282
Net income	236,334	32,472

LITTLE ROCK RAILWAY & ELECTRIC.

Gross earnings	$ 868,874	$211,663
Net earnings	417,671	93,868
Net income	277,938	56,728

KNOXVILLE RAILWAY & LIGHT.

Gross earnings	$ 707,263	$169,011
Net earnings	390,070	81,641
Net income	192,095	37,026

HOUSTON LIGHTING & POWER.

Gross earnings	$ 606,841	$171,355
Net earnings	334,306	95,045
Net income	277,642	75,308

NEW ORLEANS RAILWAY & LIGHT.

Gross earnings	$3,767,407	$887,095
Net earnings	1,907,646	494,643
Net income	384,673	107,942

BIRMINGHAM RAILWAY, LIGHT & POWER.

Gross earnings	$2,813,064	$732,546
Net earnings	1,360,866	300,817
Net income	565,910	155,693

STANDARD GAS & ELECTRIC.

The Standard Gas & Electric Company reports to the New York Stock Exchange for the year ended March 31, 1912, as follows:

Interest and dividends earned	$1,555,833
Profit on sales of securities	80,644
Gross earnings	1,636,478
Operating expenses	30,109
Net earnings	1,606,368
Interest charges	355,390
Surplus	1,250,978
Preferred dividends	544,733
Surplus	706,244

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	June 17.	June 10.
Allis-Chalmers common (New York)	¾	¾
Allis-Chalmers preferred (New York)	1⅞	2
American Tel. & Tel. (New York)	145½	145⅝
Commonwealth Edison (Chicago)	139	139
Edison Electric Illuminating (Boston)	285	285
Electric Company of America (Philadelphia)	*12¼	*12¼
Electric Storage Battery common (Philadelphia)	56	56
Electric Storage Battery preferred (Philadelphia)	56	56
General Electric (New York)	169	169
Kings County Electric (New York)	129	129
Manhattan Transit (New York)	2¼	2½
Massachusetts Electric common (Boston)	19¾	20
Massachusetts Electric preferred (Boston)	*92	92
National Carbon common (Chicago)	115	118
National Carbon preferred (Chicago)	116	118
New England Telephone (Boston)	150	*152
Philadelphia Electric (Philadelphia)	22¼	21⅞
Postal Telegraph and Cables common (New York)	84	85
Postal Telegraph and Cables preferred (New York)	68½	68¾
Western Union (New York)	82	83
Westinghouse common (New York)	72½	72½
Westinghouse preferred (New York)	118	117

*Last price quoted.

PERSONAL MENTION.

ERNEST DOUGLAS, of Owenston, Ky., has been appointed electrician for the State Capitol at Frankfort, Ky. The appointment takes effect July 1.

CHARLES A. HARMONY, municipal electrician, Centralia, Wash., has been appointed district superintendent for the Washington-Oregon Corporation.

E. S. KING, secretary-treasurer of the Merrill Railway & Lighting Company, Merrill, Wis., has been elected president of the Chamber of Commerce of that city.

CHARLES A. BARKER, of the Westinghouse Electric & Manufacturing Company at Atlanta and New York, has been elected president of the Suburban Equipment Company, New York City.

C. D. WARNER, formerly with the Moore Light Company, has recently moved to New York City, where he is engaged in the interests of the Marconi Wireless Telegraph Company of America.

EDWARD B. POLLISTER, of the Robinson Water, Light & Heat Company, Robinson, Ill., has become associated with the Busch-Sulzer Brothers-Diesel Engine Company, with headquarters at St. Louis, Mo.

HENRY W. EELS has resigned as superintendent of the Portland Electric Company, Portland, Me., and will take up the duties of general superintendent of the Central Maine Power Company at Augusta.

L. G. WHITE, of the Columbus Railway & Light Company, Columbus, O., has accepted a position with the Public Service Commission of Ohio. Mr. White has been engaged in electric lighting and railway interests in Columbus for the past 20 years.

HARVEY S. PARDEE has recently severed his connection with the Commonwealth Edison Company, and joined the firm of Miller & Pardee, which will engage in general illuminating and engineering practice, with offices in the Chamber of Commerce Building, 133 West Washington Street, Chicago, Ill.

HAROLD E. TARR, assistant division foreman, New England Telephone & Telegraph Company, made an address on July 11 before the Boston Plant Chapter of the Telephone & Telegraph Society of New England. The subject was "The Construction of Telephone Pole Lines and the Equipment of Telephone Poles."

HARRY B. IVERS, who is general manager and purchasing agent of the Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., has recently been appointed general manager of the Cumberland County Power & Light Company, of Portland, Me., and will divide his time between these two cities. Mr. Ivers has been connected with public service companies since 1893.

S. G. MEEK, who was appointed assistant general manager of the Electrical Department of the H. W. Johns-Manville Company on May 15, has been associated with the company as special representative in the electrical department for a period of over fifteen years, and has the honor of being one of the company's most successful salesmen. Mr. Meek's large acquaintance in the electrical industry will unquestionably be pleased to hear of his recent promotion. His headquarters will be at the new 12-story office building now occupied by the company at Madison Avenue and Forty-First Street, New York City.

WILLIAM H. SNOW, general manager of the municipal electric and gas plants of Holyoke, Mass., has resigned to become manager of the New Bedford (Mass.) Gas & Edison Light Company. Mr. Snow had been connected with the Holyoke Water Power Company for over 27 years when its gas and electric plants were transferred to the city of Holyoke late in 1902. Since then he has been in charge of them for the municipality. He practically rebuilt and greatly enlarged the plants and the distributing systems connected therewith and made this undertaking as successful as any can be under municipal ownership and operation.

CHARLES E. LORD, who for the past eight years has been patent attorney for the Bullock Electric Manufacturing Company and the Allis-Chalmers Company, has severed his connection with these firms to act in the same capacity for the International Harvester Company, Chicago, Ill. Mr. Lord is a graduate from the electric engineering course of the Massachusetts Institute of Technology; is a member of the American Institute of Electrical Engineers, of the American Society of Mechanical Engineers and of the American Electrochemical Society. He was for several years examiner in the United States Patent Office and has had granted him upwards of 40 patents, which are composed principally of electrical inventions.

OBITUARY.

WILLIAM R. BEAL, president of the Central Hudson Gas & Electric Company, Poughkeepsie, N. Y., died on June 5 at the age of 74 at his home in Newburgh, N. Y. Mr. Beal was well known as a philanthropist in his community. A widow, four sons and two daughters survive him.

PROPOSALS.

ELECTRIC LIGHT AND POWER PLANT.—Sealed proposals will be received by the New Baden Electric Light & Power Company until June 25 for furnishing material and constructing an electric light and power plant. The installation will include two 80-horsepower return-tubular boilers, one 35-kilovolt-ampere and one 50-kilovolt-ampere, single-phase, 60-cycle, 2,300-volt, engine-type alternating-current generators with belted exciters, two steam engines, two boiler feed pumps, one 100-horsepower feed-water heater, separators, traps, piping, one 3-panel switchboard, and complete commercial and street lighting circuits over the village. Plans and specifications may be seen in the office of Fred. J. Koch, president of the company, New Baden, Ill., or in the office of the engineers, Fuller-Coult Company, St. Louis, Mo.

NEW PUBLICATIONS.

MUNICIPAL LIGHTING IN ROCKLAND.—The report made by William Plattner, consulting engineer of Boston, to the Electric Light Investigating Committee of Rockland, Mass., has been published in pamphlet form. This investigation was carried out under instructions of a town meeting held in 1911 and covers an examination of the existing physical connections and operating efficiency of the company now operating in Rockland, with an appraisal of the property. Comparisons of cost of various plants in Massachusetts and a consideration of the relative advantages of generating and purchasing power are given.

ELECTRICAL INSTRUMENTS IN ENGLAND.—A monograph on English electrical instruments has just been issued by the Bureau of Manufactures, Washington, D. C., as a result of investigations by H. B. Brooks. In the bulletin it is asserted that English girls have failed to give satisfaction at such work as winding coils and calibrating instruments. The English manufacturer is of the opinion that the girls do well at light routine work, but are content to go on year after year performing the same tasks. For example, a girl may be taught to calibrate 100-ampere ammeters, and will do well on a lot of these, but if she is to do such instruments one day, and another sort the next, and so on, she requires too much superintendence. In one of the largest electrical works in England the time-limit system is used in the testing room. Thus, if eight hours is the alloted time for a particular piece of work and a man does it in six, he is paid for one of the hours saved and the firm saves the other. In this shop the average instrument maker earns 16 to 18 cents an hour, while some of the highest-class men make 20 to 24 cents an hour. The works of seven of the leading electrical firms in England are dealt with in the same publication.

DATES AHEAD.

Michigan Section of the National Electric Light Association. Annual convention on board the *Majectic*, sailing from Port Huron, Mich., on June 21 and returning June 25.

National District Heating Association. Annual Convention, Detroit, Mich., June 25-27.

American Institute of Electrical Engineers. Annual convention, Boston, Mass., June 25-28.

Society for the Promotion of Engineering Education. Annual meeting, Boston, Mass., June 26-29.

New England Electrical Workers' Association. Providence, R. I., July 13-14.

National Electrical Contractors' Association. Annual meeting, Denver, Colo., July 16-19.

Ohio Electric Light Association. Annual convention, The Breakers, Cedar Point, O., July 16-19.

International Association of Municipal Electricians. Annual convention, Peoria, Ill., August 26-30.

International Association for Testing Materials. Sixth congress, New York City, September 3-7.

Association of Iron and Steel Electrical Engineers. Annual convention, Hotel Pfister, Milwaukee, Wis., September 16-21.

The 1912 Boston Electric Show, Mechanics Building, Boston, Mass., September 28-October 26.

American Electric Railway Association and its five affiliated associations. Annual Convention, Chicago, Ill., October 7-11.

New England Section of the National Electric Light Association. Fall meeting, Boston, Mass., October 10-11.

The New York Electrical Exposition and Automobile Show. The New Grand Central Palace, New York City, October 9-19.

Kansas Gas, Water, Electric Light and Street Railway Association. Annual meeting, Manhattan, Kans., October 17-19.

With the Electrical Manufacturers

The Western Electric Company reports that its business for April increased 17 per cent over that of the corresponding month a year ago. This gain is somewhat due to special conditions, however.

A. L. Ide & Sons, Springfield, Ill., are sending out copies of the new bulletin No. 20, which is devoted to Ideal Corliss valve engines. The valve gear and specifications of the engine are discussed. Interesting motion diagrams are also given.

The Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued a 32-page catalog of its ball-bearing hangers for line shafts, counter shafts, etc. Among the many illustrations are views of typical installations and hanger parts and also dimension diagrams.

Toledo Electric Welder Company, Cincinnati, Ohio, has issued bulletin No. 12 on spot welders. These machines are made in a variety of types and sizes, all of which are described and illustrated, together with specimens of their work. The bulletin also gives general information and data on electric welding.

American District Steam Company, North Tonawanda, N. Y., has issued booklet G which describes the advantages and economies resulting from the atmospheric system of steam heating. This system is adapted to both the isolated boiler and district heating plants and is becoming justly popular throughout the country.

Fort Wayne Electric Works of General Electric Company, Fort Wayne, Ind., has issued booklet No. 5026, which describes the new Transpotarc, a transformer for use with theatrical spotlight and flood-light arc lamps. The booklet has an attractive cover and contains numerous sketches of Shakespearean scenes.

Union Light & Supply Company, 39 South La Salle Street, Chicago, has become the sole distributer for the W-K switch, which can be installed in showers or electrolier fixtures. Each pull of the chain lights each lamp in succession and again extinguishes each lamp successively, thus doing the work of a set of pull-chain sockets or pendent switches.

Crouse-Hinds Company, Syracuse, N. Y., has issued an illustrated complimentary booklet entitled "Get Home from Third," which will prove of intense interest to all electrical men who are devotees of baseball. It recites a dramatic incident and draws from it a valuable moral. Readers of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN can secure a copy on writing to the company.

Wagner Electric Manufacturing Company, St. Louis, Mo., is sending out a new wall calendar for the months June, 1912, to June, 1913, and also for the fiscal year 1913-1914. The design is simple but effectively emphasizes the company's trade-mark "Wagner, Quality." In a separate folder the force of the comma in this slogan is carefully pointed out, the two words being regarded as synonyms.

Westinghouse Electric & Manufacturing Company, has issued descriptive leaflet No. 2496, which describes outdoor-type, oil-insulated, self-cooling transformers. These transformers are of the same general construction as those built for indoor service with the additional features necessary for withstanding climate conditions outdoors. The leaflet describes the details of construction and shows several views of outdoor installations.

Allgemeine Elektricitäts Gesellschaft, Berlin, Germany, has published a number of interesting new bulletins. One describes several new types of crucible resistance furnaces up to 100 kilowatts capacity which are heated by the low-voltage secondary current of a transformer integral with the apparatus. In some of these furnaces as high as 24 different temperatures are obtainable by adjustment. Another bulletin describes some 15 types of trolley-wire supporting ears.

Century Electric Company, St. Louis, Mo., has just issued bulletin No. 18, devoted to Century single-phase self-starting motors. This is an attractively prepared book of 48 pages with excellent binding and engraving. Over 60 illustrations show views of these motors and their parts and numerous applications for almost every conceivable kind of machine driving. These motors are of the repulsion-induction type and are made in sizes from one-sixth to forty horsepower and for 25, 40, 60, and 133 cycles. Standard voltages are 104 and 208.

American Bushing Company, 69 West Washington Street, Chicago, is supplying a marked demand for its vitrified-porcelain insulating bushings. These are made in seven standard sizes from nine thirty-seconds to one and five-eighths-inch internal diameter, but also in any special length and diameter to suit. Each bushing is provided with a copper-plated steel clamp which, when placed in any of the parallel slots at the rear of the bushing according to the thickness of the metal through which the bushing passes, forms an absolutely tight fastening that locks itself automatically.

The Habirshaw Wire Company, New York City, gave an example of modern business getting and up-to-date methods by its part in the recent laying of cables under the Harlem River, as evidenced from the following quotation from the *Edison Monthly:* "The value of co-operation was never more thoroughly demonstrated than during the 36 hours required to place the cables in the bed of the river. The Habirshaw Wire Company manufactured all the cable and the men of the Distribution Department of the Edison Company rushed the work of sinking the cables, making fast the anchorages on either bank and splicing the wires to land transmission lines. It was the work of two nights and a day."

Pacific Electric Heating Company, Oakland, Cal., made the June issue of "Hotpoints," its monthly house organ, a particularly valuable one to central stations and supply dealers interested in the exploitation of electric heating appliances. This issue of 36 pages is replete with ideas and methods for the sale and use of heating devices that have been found successful in the large central-station systems west of the Rocky Mountains, which boast of having a larger number of these devices per capita on their lines than any other section of the country. The very satisfactory results of Hotpoint Day are pointed out and plans for further publicity work explained. A review of the company's development is given and also pictures of its executive officers and of its factories at Oakland and Chicago.

Moloney Electric Company, St .Louis, Mo., has issued a new 56-page catalog of its high-efficiency transformers. This catalog has an embossed cover design and is well illustrated. Views of the St. Louis and Windsor, Ont., works of the company are shown and there are 51 illustrations of the many types of transformers manufactured at these works. These transformers cover sizes from 100 watts to 5,000 kilowatts and voltages up to 153,000. Self-cooled, air-cooled and water-cooled transformers are made. A valuable feature of the catalog is the section devoted to transformer testing by central stations; this shows views of transformers actually under test and not merely diagrams. The company will gladly send a copy of this catalog to anyone interested in transformers, upon request.

General Electric Company, Schenectady, N. Y., has issued several new publications. Bulletin No. 4910 is devoted to oil-break switches for 600, 4,500 and 7,500-volt alternating-current circuits. These new switches, known as type F, form K-5, are of moderate rupturing capacity, liberally designed, conservatively rated, and simple in construction and operation. The bulletin enters into the details of construction and contains dimension and connection diagrams. Bulletin No. 4938 is a new publication on type H transformers that explains the construction of the parts and the care used in every feature of the manufacture, assembling and testing of these improved transformers. Bulletin No. 4949 describes direct-current portable instruments (type DP-2) which are designed for laboratory and general testing purposes. This line of instruments includes ammeters, voltmeters, milammeters and millivoltmeters.

Record of Electrical Patents.

Issued by the United States Patent Office, June 11, 1912.

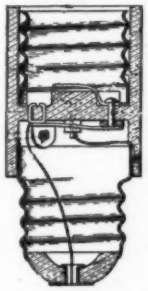
1,028,851. Long-Distance Pressure-Recorder. J. W. Bard, assignor to Sangamo Electric Co., Springfield, Ill. A recording gauge is electrically connected with a similar but remote recording mechanism by means of an alternating-current circuit.

1,028,853. Signal Mechanism for Electric Railways. R. D. Beatty, Cleveland, O. Raising of the trolley wire by the passage of a car actuates a rack that closes the switch.

1,028,854. Vehicle Signal. E. J. Best and C. M. Fitch, Chicago, Ill. Electromagnets at each end of an illuminated sign at the rear of an automobile control two designation plates, "right" and "left."

1,028,856. Annunciator and Cabinet for Barber Shops. I. J. Bradshaw, Waukegan, Ill. A pointer is given step-by-step movement through a spring and electromagnetic mechanism.

1,028,857. Apparatus for Preparing Oxone. G. F. Brindley, assignor to Roessler & Hasslacher Chemical Co., New York, N. Y. Oxone is made from



1,028,957.—Plug Socket.

sodium peroxide in a melting pot provided with electrodes connected by a resistance.

1,028,895. Electrolytic Deposition of Metals. P. Marino, London, Eng. Consists in dissolving in an aqueous solution of sodium glycero-borobenzoate a salt of the metal to be deposited.

1,028,912. Electric Steam-Generator. S. Schoenbroon, Pittsburgh, Pa. The wires pass through a looped conduit in the lower part of the boiler and connect with a set of electrode plugs along the conduit.

1,028,945. Telephone Pay Station. G. A. Long, assignor to Gray Telephone Pay Station Co., Hartford, Conn. The signal in the case is mounted on a non-resonant support.

1,028,948. Controller. J. H. Menningen, assignor to Allis-Chalmers Co., Milwaukee, Wis. The drums may be shifted laterally, but only when the control arm is in "off" position.

1,028,957. Plug Socket. J. W. Phelps, Detroit, Mich. Has a pivot switch secured on the transverse wall between the plug and socket.

1,028,963. Dynamo-Electric Machine. W. H. Powell and R. B. Williamson, assignors to Allis-Chalmers Co. Relates to the ventilation of a turbogenerator.

1,028,964. Brush for Dynamo-Electric Machines. A. Press, assignor to Bullock Electric Manufacturing Co. A laminated iron brush, only alternate laminae of which extend to the commutator.

1,028,965. Dynamo-Electric Machine. H. H. Ralston, assignor to Bullock Electric Manufacturing Co. Each commutator bar has a slot and an extension or neck having an apertured end seated in the slot, the side of the bar being locally depressed into the aperture.

1,028,969. X-Ray Tube. J. Rosenthal, Munich, Germany. Contains a screen that permits the cathode rays to pass, but intercepts those from the anode.

1,028,980. Electrical Signaling Device. T. Weiss and T. A. Walther, Chicago, Ill.; said Walther assignor to said Weiss. The diaphragm in a horn is struck by a tapper oscillated by a motor through a ratchet.

1,028,983. Winding Machine. A. H. Wouters, assignor to Allis-Chalmers Co., and Bullock Electric Manufacturing Co. Comprises a rotatable former, a movable frame carrying a supply of copper strip to be edgewise wound, and an anti-buckling guide and a tension device carried by the frame.

1,028,984. Storage-Battery Lamp. C. B. Bartley, assignor of one-half to G. F. Rylands and one-fourth to R. H. Rush, Charleroi, Pa. A sheet-metal battery case carries a lamp and reflector and switch on one flat face.

1,028,985. Dynamo-Electric Machine. B. A. Behrend, assignor to Allis-Chalmers Co., and Bullock Electric Manufacturing Co. The rotor has special end plates to hold the windings in place.

1,028,993. Motor-Operated Switch. H. W. Cheney, assignor to Allis-Chalmers Co. The motor moves the switch to both open and closed positions through a coiled spring.

1,028,999. Massage Apparatus. C. Endorf, Jr., assignor to Commercial Electric Motor Manufacturing Co., Chicago, Ill. An eccentric on the armature shaft is connected to the vibrator.

1,029.007. Frequency-Responsive Device. B. Frankenfield, assignor to Allis-Chalmers Co. A frequency indicator consisting of a motor whose field and armature circuits are in quadrature phase relation and which exerts no torque at normal frequency, the pointer on the armature being restrained by a spring at other frequencies.

1,029,015. Secondary Battery. G. J. Johnson, assignor to E. C. Tourtelot, Chicago, Ill. The active material is applied to perforated chambers in permeable, but non-conducting plates adjoining which are lead sheets.

1,029,042. Electrical Measuring Instrument. W. E. Beede, New York, N. Y. A watch-case ammeter of the plunger type in which the armature, counterweight and pointer are in one piece.

1,029,044. Mechanical Movement and Electric-Light Socket. T. A. C. Both, assignor to Zee Socket & Manufacturing Co., Boston, Mass. Relates to the operating mechanism for the socket switch.

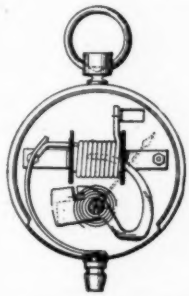
1,029,050. Trolley Wheel. E. U. Down, Bowling Green, O. Has a special oil magazine to provide lubrication.

1,029,098. High-Potential Electric Switch. C. C. Badeau, assignor to Sears B. Condit, Jr., Brookline, Mass. An oil switch biased to open position, has an interlock to permit closure normally, but to prevent closure if the bias fails.

1,029,114. Heater and Glower Renewal for Lamps. O. Foell, A. Kusebauch and R. Neckerman, assignors to Nernst Lamp Co., Pittsburgh, Pa. The heater support carries prongs for connecting it to the terminals and securing it to the base.

1,029,120. Registering Weighing Apparatus. H. E. T. Haultain, Toronto, Canada. Has an electrical recording mechanism.

1,029,121. Apparatus for Graphitizing Large Electrodes. P. L. T. Heroult, assignor to Electrode Company of America, Niagara Falls, N. Y. The electrodes are placed end to end in a furnace and current passed through them.



1,029,042.—Watch-Case Ammeter.

1,029,122. Graphitizing Electrodes. P. L. T. Heroult, assignor to Electrode Company of America. An electrode made up of sections, the joined ends of which are graphitized and other parts of which are not graphitized to the same extent.

1,029,123. Electrical Means for Magnifying Small Mechanical Effects. E. S. Heurtley, Oxford, England. The forces to be measured are caused to affect the temperature of a resistance element in an electrical circuit.

1,029,150. Electromagnet. N. H. Suren, assignor to Gamewell Fire-Alarm Telegraph Co., New York, N. Y. Relates to the mounting of the armature.

1,029,170. Rapid-Weighing Scale. N. B. Converse, Fresno, Cal., assignor to himself, J. E. Dickinson, F. M. Wright, B. W. Norton, L. Z. Ickes, and K. Araklian. Has an electromagnet to attract the scale beam to the position it assumes when the load has been removed.

1,029,179. Automatic Fire-Alarm Apparatus. G. F. Emch, Woodville, O. A touch-off unit, comprises a fusible part, release of which closes an electric alarm circuit.

1,029,207. Insulator Support. O. P. Megahan, Westerville, O. Hooks over the cross-arm and carries two insulators.

1,029,210. Automatic Brake-Applying

Means for Railways. A. Minnick, Coeur d'Alene, Ida., assignor to Minnick Automatic Train Controller Co. An electric device controls the successive opening and closing at short intervals of the air outlet valve.

1,029,230. Apparatus for Heating Electrical Units. H. H. Russell, assignor to W. D. Hodson, Janesville, Wis. An electric radiator with the heating elements in a central chamber.

1,029,233. Electric Sadiron. V. Schild, assignor to J. Welter, Passaic, N. J. The heating element is mounted in the bottom plate out of contact with the cover plate.

1,029,250. Electric - Switch - Operating Mechanism. A. B. Allen, assignor to Allen Switch Co., Pueblo, Colo. A solenoid-operated switch mounted in a box is protected by fuses in a pole box.

1,029,261. Delay-Action Exploder. F Bernardi and J. B. Sauve, assignors to Patent Electric Fuse Spitter Co., Mokelumne Hill, Cal. Includes electrical ignition for the fuse.

1,029,275. Railway Signaling Apparatus. C. W. Coleman, Westfield, N. J., assignor to Hall Signal Co. Provides electrical control for a pneumatically operated semaphore.

1,029,276. Regulating Dynamo-Electric Machines. G. H. Condict, New York, N. Y. The first movement of the controller weakens the main fields without affecting the commutating fields; subsequent movements strengthen the latter fields.

1,029,277. Fire-Extinguishing Apparatus. E. T. Copeland and E. W. Copeland, New York, N. Y. The sprinkler-head valve is held closed by a fusible link which can be electrically heated.

1,029,344. Regulating Resistance for Electrolytic Condensers. E. E. F. Creighton, assignor to General Electric Co. A high-resistance shunt is automatically connected across the condenser when the temperature of the latter becomes abnormal.

1,029,350. Metallic-Filament Lamp. K. Farkas, assignor to J. E. Walscheid, Weehawken, N. J. The leads have each an enlarged flat end at right angles to each other and over which is fused a glass rim into which are fused the supports for the filaments.

1,029,362. Control System. J. L. Hall, assignor to General Electric Co. A motor controller biased to "off" position which governs the operation of the motor-driven machine.

1,029,366. Electric Switch. E. M. Hewlett, assignor to General Electric Co. An oil switch that is opened by compressed oil acting in a pressure motor.

1,029,375. Vapor Electric Apparatus. O. O. Kruh, assignor to General Electric Co. A mercury-arc rectifier with shields for the lateral electrodes.

1,029,380. Means for Preliminarily Heating Internal-Combustion Engines. A. A. Low, Horseshoe, and H. Hertzberg, New York, N. Y.; said Hertzberg assignor to said Low. Has an electric heater in one of the pipes carrying the circulating water.

1,029,383. Process of Mounting and Soldering Electrical Filaments. S. Marietti, assignor to Société Anonyme des Perfectionnements aux Lampes Electriques à Filaments Metalliques, Brussels, Belgium. An arc is produced at the junction of the filament and leading-in wire, but the filament is protected by a current of air.

1,029,384 and 1,029,385. Globe-Holder. J. E. Martin, assignor to Bryant Electric Co., Bridgeport, Conn. Two somewhat different forms of spring clasps are described, each having an inner coil to clasp the globe and two external coil ends to bear against the collar with handles passing through slots in the latter.

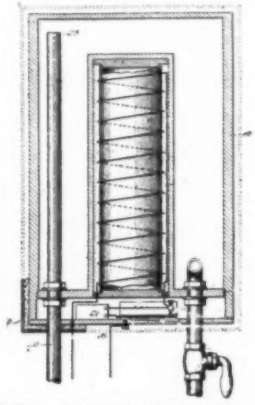
1,029,388. Electromagnetic Apparatus. J. McIntyre, Jersey City, N. J. Has an auxiliary magnet to project a field at right angles to the movement of the main armature.

1,029,389. Welding Machine. A. Metzger, assignor to General Electric Co. An electrically driven carriage moves over the seam to be welded and carries a welding electrode.

1,029,408. Trolley. J. H. Walker, Lexington, Ky. Relates to the method of supporting the pole on top of the car.

1,029,428. Electrical Distribution System. J. P. Crouch and J. Etchells, Manchester, England. A lighting system, including a dynamo, two storage batteries, compensating resistances, regulators and automatic switches.

1,029,444. Pot-Filling Apparatus for Glass Furnaces. P. Hoffmann, Tarentum, Pa. An electrically controlled and motor-driven charging outfit.



1,029,523.—Automatic Water Heater.

1,029,480. Motor Speed Regulator. A. A. Tirrill, assignor to General Electric Co. A motor driving a generator has a device in its field circuit for periodically short-circuiting a field resistance, the interval length depending on the variation of the generator frequency from normal.

1,029,504. Selective Telephone System. W. F. Marten, Oakland, Cal. A party line has at each station selecting coils between one line wire and ground, and releasing coils between the other wire and ground.

1,029,521. Electrical Signaling Device. T. Weiss, Chicago, Ill. A motor-driven rotatable head operates a tapper adjacent to the diaphragm.

1,029,523. Automatic Electric Water-Heater. J. I. Ayer, assignor to Simplex Electric Heating Co., Cambridge, Mass. Contains a central heating coil regulated by a thermostat in the base.

1,029,524. Telephone-Receiver Shell. J. F. Barbour, assignor to Dean Electric Co., Elyria, O. Describes a special construction of the ear piece.

1,029,539. Rheostat. W. H. Gaulke, assignor to Independent Electric Manufacturing Co., Milwaukee, Wis. The resistance coils are wound on insulating tubes through and about which cooling air can circulate.

1,029,556. Lighting Fixture. J. L. Palmer and C. N. Wheeler, Peoria, Ill. The end of the hollow fixture arm has a closure that also supports a lamp socket.

1,029,557 and 1,029,558. Electric Fixture. J. L. Palmer and C. N. Wheeler, Peoria, Ill. Modifications of the above.

1,029,573. Wireless-Controlled Current-Distributer. C. Wirth, assignor to Wirth, Beck & Knauss, Nuremberg, Germany. Relates to the interconnection of the coherer and decoherer circuits.

1,029,577. Telephone-Exchange System. E. E. Clement, Washington, D. C. Has a special signal-receiving headquarters connected with the exchange.

Reissue.

13,426. Alternating-Current Motor. V. A. Fynn, St. Louis, Mo. Original No. 967,362, dated Aug. 16, 1910. The rotor has a commuted winding and a second winding closed on itself.

Patents that Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired June 18, 1912.

541,073. Electric-Car Brake. G. B. Damon, Lowell, Mass.

541,077. Telephone System. W. W. Dean, St. Louis, Mo.

541,081. Storage Battery and Method of Making Same. N. H. Edgerton, West Whiteland, Pa.

541,121. Device for Conducting Electricity to Lamps, etc. G. F. Rose, London, Eng.

541,136. Rheostat or Other Circuit-Controller. C. Willms, Baltimore, Md.

541,148. Current-Strength Indicator. P. G. Burgess, Boston, Mass.

541,149. Transmitter. J. Burry, New York, N. Y.

541,152. Distributing Frame for Telephone-Circuit Conductors. F. B. Cook, Chicago, Ill.

541,165. Electric Railway. R. M. Hunter, Philadelphia, Pa.

541,179. Electric Arc Lamp. C. A. Pfluger, Chicago, Ill.

541,194. Electric Switch for Railways. L. Wheeler, Sioux City, Iowa.

541,200. Electric Elevator. R. Eickemeyer, Yonkers, N. Y.

541,225. Repeater. M. G. Crane, Newton, Mass.

541,227. Electric Switch. C. P. Elieson, London, Eng.

541,233. System of Electrical Distribution. C. K. Huguet, New Orleans, La.

541,243. Push-Button. F. W. Manger, Brooklyn, N. Y.

541,287. Electric Stop Motion for Engines. E. C. Myrick and G. C. Doeg, Providence, R. I.

541,290. Arc Lighting. S. W. Rushmore, Brooklyn, N. Y.

541,341. Electric Alarm Signal and Indicator for Trolley Railroads. J. A. Buisson, New Orleans, La.

541,357. Compound-Wound Alternating Generator. J. D. Hilliard, Jr., Bluefield, W. Va.

541,367. Electric Truss. B. R. Lathrop, Weedsport, N. Y.

541,380. Armature for Electric Motors and Generators. J. F. McLaughlin, Philadelphia, Pa.

541,389. Electric Train Signal. E. J. Devine, Port Arthur, Canada.